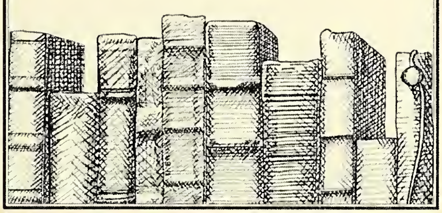


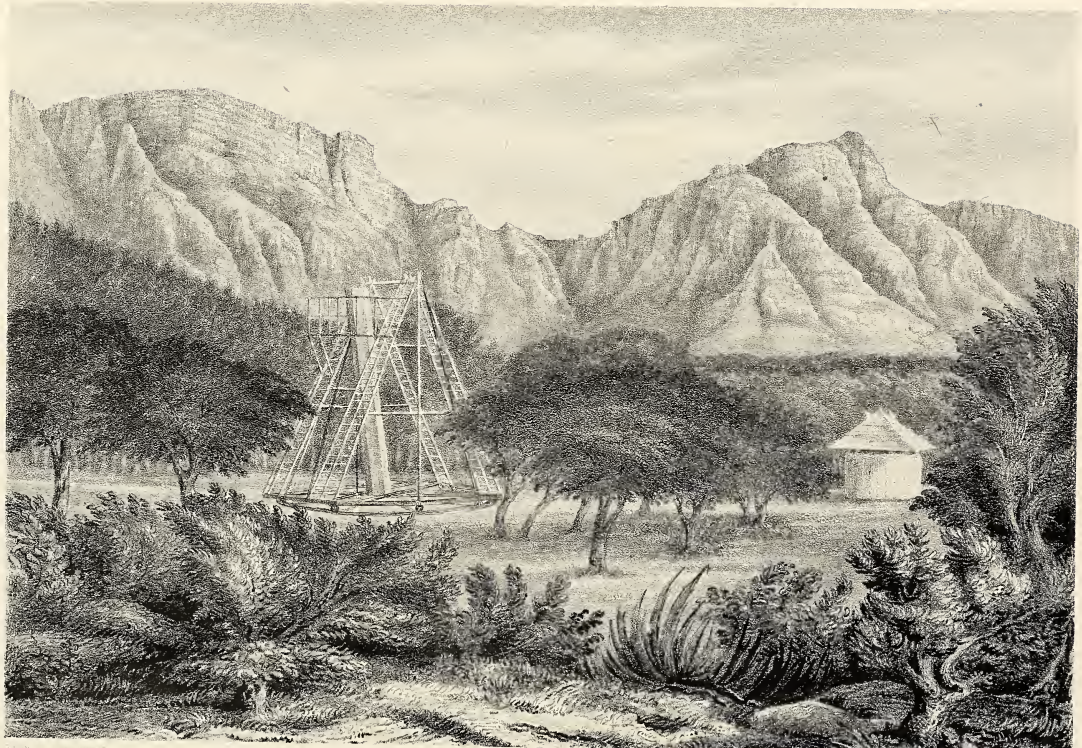
RESULTS

OF

ASTRONOMICAL OBSERVATIONS

MADE DURING THE YEARS 1834, 5, 6, 7, 8,

AT THE CAPE OF GOOD HOPE.



SITE OF THE TWENTY FEET REFLECTOR AT FELDHAUSEN

Cape of Good Hope Sep. 1834

London Smith Elder & Co. 65 Cornhill

RESULTS

OF

ASTRONOMICAL OBSERVATIONS

MADE DURING THE YEARS 1834, 5, 6, 7, 8,

AT THE CAPE OF GOOD HOPE;

BEING THE COMPLETION OF A TELESCOPIC SURVEY OF THE WHOLE SURFACE OF THE VISIBLE HEAVENS,

COMMENCED IN 1825,

BY

SIR JOHN F. W. HERSCHEL, BART, K.H.

rederick William

M.A.; D.C.L.; F.R.S. L. & E.; HON. M.R.I.A.; P.R.A.S.; F.G.S.; M.C.U.P.S.;

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HISTORICAL SOCIETY OF NEW YORK (U. S.);
ROYAL MEDICO-CHIRURGICAL SOCIEY, AND INSTITUTION OF CIVIL ENGINEERS, LONDON;
GEOGRAPHICAL SOCIETY OF BERLIN; ASTRONOMICAL AND METEOROLOGICAL SOCIETY OF BRITISH GUIANA;
ETC. ETC. ETC.

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TO

THE MEMORY OF

THE LATE

HUGH, DUKE OF NORTHUMBERLAND,

CHANCELLOR OF THE UNIVERSITY OF CAMBRIDGE,

THE ENLIGHTENED FRIEND

AND MUNIFICENT PATRON OF SCIENCE,

THIS WORK

IS GRATEFULLY INSCRIBED

BY

THE AUTHOR.

CONTENTS.

INTRODUCTION.

(i.) The work which is now presented to the astronomical public, completes a review of the sidereal heavens, which I commenced about the year 1825, proposing to myself, at that time, no further object than a re-examination of the nebulæ and clusters of stars discovered by my Father in his "Sweeps of the Heavens," and described by him in three catalogues presented to the Royal Society, and published by that illustrious body in their Transactions for the years 1786, 1789, and 1802. This re-examination occupied about eight years, and its results were presented to the Royal Society in the year 1833, in the form of a catalogue, arranged in order of Right Ascension, and published in their Transactions for the same year. In this work are recorded observations of 2306 nebulæ and clusters, of which 1781 are identical with objects occurring, either in my Father's catalogues, in the small but interesting collection published by Messier in the *Mémoires de l'Académie des Sciences* for 1771, and the *Connaissance des Tems* for 1783, 1784; and in M. Struve's catalogue of double stars: the remaining 525 are new. Besides these more especial objects of pursuit, however, a great number of double stars, of all classes and orders, were noticed and described, and their places taken, to the amount, altogether, of between three and four thousand, the observations of which, being reduced and arranged in order of Right Ascension, have been, from time to time, published by the Royal Astronomical Society of London, in six catalogues, which will be found in the 2nd, 3rd, 4th, 6th, and 9th volumes of their Transactions.

(ii.) Having so far succeeded to my wish (the places of the objects thus determined proving, on the whole, satisfactory), and having by this practice

acquired sufficient mastery of the instrument employed (a reflecting telescope of 18¼ inches clear aperture, and 20-feet focus, on my Father's construction), and of the delicate process of polishing the specula; being, moreover, strongly invited by the peculiar interest of the subject, and the wonderful nature of the objects which presented themselves in the course of its prosecution, I resolved to attempt the completion of a survey of the whole surface of the heavens, and for this purpose to transport into the other hemisphere the same instrument which had been employed in this, so as to give a unity to the results of both portions of the survey, and to render them comparable with each other.

(iii.) Accordingly, having placed the instrument in question, as well as an equatorially mounted achromatic telescope of five inches aperture, and seven feet focal length, by Tulley, which had served me for the measurement of double stars in England, together with such other astronomical apparatus as I possessed, in a fitting condition for the work, and taken every precaution, by secure packing, to insure their safe arrival in an effective state, at their destination, they were conveyed (principally by water carriage) to London, and there shipped on board the *Mount Stewart Elphinstone*, an East India Company's ship, —— Richardson, Esq. Commander, in which, having taken passage for myself and family for the Cape of Good Hope, we joined company at Portsmouth, and sailing thence on the 13th November, 1833, arrived, by the blessing of Providence, safely in Table Bay, on the 15th January, 1834, and landed the next morning, after a pleasant voyage, diversified by few nautical incidents, and without seeing land in the interim. It was most fortunate that, availing himself of a very brief opportunity afforded by a favourable change of wind, our captain put to sea when he did, as we subsequently heard that, immediately after our leaving Portsmouth, and getting out to sea, an awful hurricane had occurred from the S. W. (of which we experienced nothing), followed by a series of south-west gales, which prevented any vessel sailing for six weeks. In effect, the first arrival from England, after our own, was that of the *Claudine*, on the 4th of April, with letters dated January 1st.

(iv.) Having disembarked the instruments without accident, and placed them, temporarily, in one of the Government storehouses (being permitted to do so through the obliging kindness of W. Petrie, Esq. Deputy Commissary General of the Colony), my next care was to look out for a comfortable residence in a locality suitable for their erection. This I was fortunate enough speedily to find at

the mansion of a Dutch proprietor, W. A. Schonnberg, Esq., bearing the name of Feldhuysen, or Feldhausen, about six miles from Cape Town, in the direction of Wynberg, a spot charmingly situated on the last gentle slope at the base of the Table Mountain, on its eastern side, well sheltered from dust, and, as far as possible from wind, by an exuberant growth of oak and fir timber; far enough removed from the mountain to be, for the most part, out of the reach of annoyance from the clouds which form so copiously over and around its summit, yet not so far as to lose the advantage of the reaction of its mural precipices against the south-east winds which prevail with great violence during the finer and clearer months, but which seldom *blow home* to the rock on this side, being, as it were, gradually heaved up by a mass of comparatively quiescent air imprisoned at the root of the precipice, and so gliding up an inclined plane to the summit on the windward side, while they rush perpendicularly down on the leeward with tremendous violence like a cataract, sweeping the face of the cliffs towards Cape Town, which they fill (as well as the valley in which it stands) with dust and uproar, chiefly during the night. This residence needing some repairs, and being, in fact, not then actually vacant, a temporary residence was secured, at a convenient distance, in a tenement belonging to —— Borcherds, Esq., of Cape Town, called Welterfrieden, whence I could superintend the erection of the instruments, which was forthwith commenced, and pushed forward with such effect, that on the 22nd of February I was enabled to gratify my curiosity by a view of α Crucis, the nebula about η Argûs, and some other remarkable objects, in the 20-feet reflector; and, on the night of the 5th of March, to commence a regular course of sweeping.

(v.) Shortly after, the erection of a building was commenced to receive the equatorial instrument, which, so soon as the walls were settled, and the pier, which was of brick, laid in Roman cement, consolidated, was placed on its supports, and being surmounted by a revolving roof of a peculiar construction (See Art. 158), contrived by myself, and constructed in England for the purpose, was brought into approximate adjustment; and on the 2nd of May, a series of micrometrical measures of southern double stars was commenced by the measurement of α Centauri, the chief among them. I ought to observe that, on unpacking this and the other instruments and apparatus, not a single article was found to have sustained injury.

(vi.) The Frontispiece to this volume exhibits the Reflector, and the building

containing the Equatorial, in their enclosure, a kind of orchard, surrounded on all sides by trees, but commanding a tolerably near approach to both the southern, eastern, and northern horizon. To the west, the nearer vicinity of the trees, though cutting off much of the sky, yet afforded a valuable protection from the fury of the north-west gales which prevail in the winter months. Nor was it without some regret on this account, that the removal of a portion of this friendly shelter was resolved on to afford a view of the comets of Encke and Halley, when so situated as to require it. The exact geographical site of Feldhausen was found by trigonometrical measurement (See Appendix E), to be 2′ 53″.55 south, and 0^m 4^s.11 west of that of the Royal Observatory of the Cape, that is to say, in Lat. 33° 58′ 56″.55, Long. 22^h 46^m 9^s.11 from Greenwich. Its altitude above the site of that building was ascertained by barometrical observation to be 112.23 feet, or about 142 feet above the mean sea-level of Table Bay (See Appendix B).

(vii.) As I have mentioned the Royal Observatory of the Cape, I must take this distinct and early opportunity to acknowledge my many and great obligations to my excellent friend, Thomas Maclear, Esq., its director, whose ardent love for the science to which he has devoted himself, seconded by talent of no common order, by resource which no difficulties exhaust, and by activity which no exertion wearies, has secured, and continues to secure, for the noble establishment under his direction, a reputation of the highest rank, and for himself, the best titles to the gratitude of his country, and the approbation of the government he serves. To his kindness I am indebted for much and most valuable aid in fixing, with all the precision which the fine instruments under his command could afford, the Right Ascensions of a great many stars of which a knowledge was indispensable in the reduction of my sweeps, and which I neither could obtain with sufficient exactness from the existing catalogues, nor had any means of ascertaining for myself, unless by entering upon an express course of observation for that very purpose, such as formed no part of my original design, and for which a much superior transit to that I had brought out with me would have been requisite. Previous to leaving England, I had procured a MS. list of the stars of the Brisbane Catalogue, then preparing for publication, containing the places of between seven and eight thousand southern stars, and on this Catalogue, when it should appear, I had confidently reckoned for as many well determined zero stars as I could possibly need, the system of observing I pro-

posed to follow being entirely differential. With the Polar distances of that catalogue, I seldom had much occasion to find fault; but as respects the Right Ascensions, I experienced less satisfaction in its use. On mentioning this circumstance to Mr. Maclear, he, with ready alacrity, at once offered to determine this important element, by direct observation, for as many zero stars as I might require, thus rescuing me from a very serious difficulty. I need hardly add that I gladly availed myself of, and drew largely on his kindness; and the results of his observations in the cases of about 670 stars, fixed by two or three observations of each, have proved a most material assistance to me in the reduction of my sweeps. Nor was this the only instance of useful and effective aid rendered me from the same quarter.

(viii.) Previous to quitting England, I had engaged the services of an attendant for the purpose of working the sweeping, and other mechanical movements, of the Reflector during the observations, and executing any necessary repairs. John Stone, the person so engaged, to the useful, and, indeed, indispensable qualifications of a ready mechanic, whether in wood or iron work, joined that of experience in this particular employment, having performed that office for me during a considerable portion of my review of the northern heavens, with undeviating steadiness and regularity, as he continued to do during the whole of that of the southern, without once absenting himself from his duty. This indispensable manual aid excepted, it is right to mention that the whole of the observations, as well as the entire work of reducing, arranging, and preparing them for the press, has been executed by myself. The repolishing of the reflectors, it will of course be understood, could be delegated to no other person.

(ix.) Of these I was provided with three, viz., one made by my Father, and used by him in his 20-feet sweeps, and other observations; one made by myself, under his inspection and instructions; and one which I ground and figured subsequently, but which was cast at the same time, and from the same metal as that last mentioned. They are each $18\frac{1}{4}$ inches of clear diameter of polished surface, and all, so far as I am able to judge, equally reflective when freshly polished, and in every respect similar in their performance. One of them (the first completed, of the two newer ones above mentioned) is about two inches longer in focus than the others, a difference which, the figure being otherwise good, it has not been thought worth while to correct.

(x.) The operation of repolishing was performed whenever needed, the whole of the requisite apparatus being brought for the purpose. It was very much more frequently required than in England; and it may be regarded as fortunate that I did not, as at first proposed (relying on the possession of three perfect metals), leave the apparatus in question behind. Being apprehensive that in a climate so much warmer, difficulties would arise in hitting the proper temper of the polishing material, slight imperfections of surface, induced by exposure, were for a while tolerated; but, confidence in this respect once restored, and practice continually improving, I soon became fastidious, and on detection of the slightest dimness on any part of the surface, the metal was at once remanded to the polisher.

(xi.) And here, perhaps, I may be allowed a digression on a point of the utmost importance in the use of reflecting specula, viz., the mode of supporting the metal in its case. This, in my own practice, is provided for as follows:—between the back of the case and the mirror are interposed six or eight thicknesses of coarse woollen baize, or blanketing, of even texture, and quite free from knots, stitched together at the edges to prevent any hard substance from getting between them. On this bed the metal is laid flat, and being shaken into a concentric situation, as respects the rim of the case, two supports formed of strips of similar woollen stuff, many times doubled, occupying about 30° each of the circumference of the case, are introduced, so as to leave an arc of about 40° unoccupied, opposite the point which is intended to be placed lowermost in the tube. The case being then raised into an inclined position by the other handle, and slightly shaken, the mirror takes its own free bearing on these supports, which by their elasticity obviate the possibility of any lateral compression which might go to the extent of seriously disfiguring the metallic surface, were the whole vertical pressure of the mirror confined to a hard point near the bottom, or even distributed over two or three metallic bearings in the circumference.

(xii.) Simple, and indeed homely as this mode of bedding the speculum may appear, it is, I am satisfied, as effectual (it certainly is quite as little costly and cumbersome) as any which can be contrived. The uniform support of a reflector over its whole extent, is a point of the last importance to its optical performance. *A distortion of figure by flexure, which in the object-glass of a refracting telescope would produce no appreciably injurious effect, would be utterly fatal to distinct vision in a reflecting one.* This will be made apparent if we con-

sider the different modes in which the convergence of the rays is effected by reflexion at a curved metallic surface, and by refraction through one or more glass lenses. In the former case, the whole deviation of the ray from its original direction is effected at one surface, and, in amount, is equal to twice the inclination of that surface to a perpendicular on the original direction. Any alteration, therefore, which flexure may produce on the inclination of the surface (supposed originally parabolic) of a speculum to its axis, at a given point, will produce an angular deviation of the reflected ray from its proper course to a double amount. And the lateral aberration produced by such deviation will be expressed by that double amount of angular flexure, multiplied by the focal distance, and is, therefore, the more injurious the greater is the focal length. On the other hand, in the case of a refracting telescope, the deviation of a ray is effected by the prismaticity of the medium, or media, of which the object-glass consists, at the points where the ray penetrates them, and is independent of the absolute inclination of either separate surface to the axis. In consequence, however, this inclination may change by flexure in any one of the lenses of which the object-glass consists, yet, so long as both surfaces of the lens bend alike, which they cannot but do in any conceivable case of flexure short of fracture, the effective prismatic angle at that point, and consequently, also, the inclination of the transmitted ray to the axis remains absolutely unaltered, and the whole amount of lateral aberration produced is that which arises from the bodily displacement of the transmitting portion of the lens in a direction to or from the focus by the effect of the flexure, a displacement which, in itself utterly inappreciable, is still farther reduced in its effect to produce *lateral* aberration, that it comes to be multiplied by a fraction whose numerator at the maximum is the semi-aperture of the object-glass, and whose denominator is the focal length of it.

(xiii.) This inequality of proportion between the two cases is still farther augmented by the lightness of glass compared with metal, which (surface for surface, and rigidity for rigidity) makes the absolute flexure of a given thickness of glass much less than of an equal thickness of metal. And it is very fortunate that all these conditions hold good; for since there is no possibility of supporting a transparent substance against flexure, without stopping the light, this cause alone (had it acted to the extent it does in reflectors) would long since have banished large object-glasses from practical use. A speculum (I speak from

experience) of the dimensions and thickness used in my sweeps, is *totally spoiled* by supporting it on three metallic points at the circumference, when directed to the zenith. The image of every considerable star becomes triangular, throwing out long flaring caustics at the angles. On one occasion, I supported a mirror simply against a flat board, at about 45° elevation from the horizon. In this state its performance was tolerably good; but on stretching a thin packthread vertically down the middle of the board, so as to bring the weight to rest on this as on one axis, the images of stars were elongated, in a horizontal direction, to a preposterous extent, and all distinct vision utterly destroyed by the division of the mirror into two lobes, each retaining something of its parabolic figure, separated by a vertical band, in a state of distortion, and of no figure at all.

(xiv.) Springs are sometimes used by opticians at the back of a small mirror, for the purpose of keeping it home to the rim of its case. They are usually three in number, and so far as mere support of the mirror is concerned, they act as three non-elastic supports would do, *i. e.* disadvantageously. More numerous and weaker springs distributed over the whole of the back of the case would seem to be preferable, but they ought to be so weak that *all* should be *much* compressed and brought into full action by the pressure. And even then, if the metal be confined in its case by a rim in front, a spring-pressure upward, which in a horizontal position of the surface would barely sustain it in contact with the rim, will urge it, when placed vertically against the rim, with a force equal to the whole weight of the metal applied over its surface in a direction perpendicular thereto, and will tend therefore to distort it in that position, to the very same amount, but in an opposite direction, that it would have been distorted by gravity in the other position, had the springs been absent, and the support been given by a metallic ring at the circumference of the back.

(xv.) Nothing, therefore, is gained, so far as obviating flexure is concerned, by a distribution of elastic support, *so long as the mirror is pressed against a rim in front.* To make such a mode of support effective, the metal must be free to rise and fall, and the friction on the lower circumference must be counteracted, either by resting it in a circular iron chair, provided with exterior rollers, or otherwise equably supporting the lower portion of its edge, so as to allow of its shifting forwards or backwards without sensible friction; as, for instance, by suspending the metal from the upper side of its case, in a jointed frame, composed

of two semicircles of steel loosely riveted at the extremities of their common, horizontal diameter, to admit of free play at the joint, the lower semicircle being thin, and lined with velvet or flannel to ensure equal pressure against the lower edge of the metal; the upper stronger, and increasing gradually in stiffness towards the top, by which the whole should be suspended on a hinge-pin.*

(xvi.) As an experiment, I constructed a case, having the back of stout wood set over with ninety steel springs, of such strength as to be all of them pressed nearly into contact with the wood by the weight of the mirror laid horizontally on them, and distributed with as much uniformity as possible in their points of bearing over the whole surface of the back, the face being left entirely unconfined. So supported, the performance of the mirror was good at all altitudes, but by no means better than when bedded on woollen cloths, as above described, nor, indeed, equal to it; and, in fact, when we consider that each fibre of wool is a delicate coiled spring of almost perfect elasticity, it is clear that no artificial arrangement of metallic springs we can make, can attain the perfection of such a natural one (if we may so apply the term), either in uniformity of distribution, or in delicacy of application. This consideration led me to abandon the use of a spring case, after making a very few sweeps with it, and re-adopt, in its stead, the woollen bedding which had been laid aside to make way for what proved to be, in effect, no substantial improvement on it. It is essential, however, that a great many thicknesses of the baize or blanket employed, should be used, *by which only the effect of flexure in the wooden back itself of the case can be eliminated.* And to keep up the elasticity of the fibre, it should be occasionally taken out and beaten.†

(xvii.) A serious, indeed a fatal objection, would appear to lie against the use of flexible, elastic, or any kind of moveable support for the mirror; in the fluctuations liable to be caused by it in the line of collimation when the inclination

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* This was written while ignorant of the very ingenious contrivance by which Lord Rosse affords an equable, or nearly equable support to his large reflector. Comparative trial of the several methods can alone decide, in any proposed case, which is the most effectual.

† The following memorandum occurs in sweep 687:—

"The mirror, though a capital one, has, for the last three nights, given distorted images with its full aperture, which appear horned and tailed. To-night, before the sweep, I took it out, and carefully smoothed, shook up, and remade its bed. *Now*, nothing can be finer. It lies at its ease, and equally supported all over, and all the appendages are clean gone."

of the mirror to the horizon is varied, and which must inevitably take place if there be either the least friction of the lower edge on its support, or anything short of mathematical exactness in the distribution of the pressure. But this objection is completely obviated in my mode of observation, by the use of an interior collimating telescope, as described in Phil. Trans. 1833, p. 488. The collimator used in the greater part of these observations differed only from that there described, 1st, in being a more powerful telescope (viz., an achromatic of four feet focal length, with a good object-glass, $2\frac{3}{4}$ in. aperture), and, 2nd, in. having the plane speculum placed, not as there described, between the object-glass and its focus, but beyond the focus (in which the collimating cross is fixed), so as to illuminate that cross by the light of a lamp external to the tube of the large reflector, collected by a lens upon the cross, both great improvements in practice.

(xviii.) Sweeping (for so I shall continue to denominate the system of observation in zones of 3° breadth in Polar distance in search of new objects), was prosecuted, in the absence of the moon, on all occasions when weather permitted, and the definition of the stars was such as to render it worth while to do so. And this leads me to speak of the climate of the Cape as regards its favourableness or unfavourableness for astronomical observation. In the hot season (from October to March), and especially during the hotter months of that season, the nights are for the most part, superb, at least in all the flat region at a few miles distance from the mountains; but in their immediate vicinity, the south-east wind (then generally prevalent) frequently brings with it a belt of cloud extending many miles from the hills, and cutting off the view of the sky. This (which is sometimes called a black south-easter) comes on often at night, and lasts several nights in succession. Very often, too, when no such impediment exists, the excessive heat and dryness of the sandy plains gives rise to a disturbance of the optical tranquillity of the air, so as to destroy, or much impair, distinct vision, and that frequently in a very singular manner. In some cases, the images of the stars are violently dilated, and converted into ill-defined nebulous balls, or puffs, of 10 or 15″ or more in diameter.* In others, they form soft, quiet, round pellets

* During the conjunction of Saturn and γ Virginis, at the end of March, 1834, both were seen in the same field of the 20-feet reflector, in such a state of indefinition, that but for the greater quantity and different colour of the light of Saturn, it could not have been told which was the planet, and which the star. Yet, to all appearance, the night would have been judged a fine one.

of 3 or 4″ diameter, very unlike the "spurious discs" which they present when best defined, and rather resembling planetary nebulæ. In other cases, again, the structure, as it were, of these pellets is disclosed, and they are seen to arise from an infinitely rapid vibratory movement of the central point, in all possible directions, while, on a few occasions, the appearances have been exceedingly perplexing and singular, and such as there is difficulty in accounting for on any optical principle whatever.*

(xix.) Even in the hottest season, however, nights of admirable definition occur, especially looking southwards. But, what is not a little remarkable, in the very hottest *days*, looking *northwards* over the burning tract intervening between Feldhausen and Table, or Saldanha Bay, the most admirable and tranquil definition of the solar spots, and other phenomena of the sun's disc, is by no means unfrequent. In such cases, I presume the strongly heated stratum of air incumbent on the surface of the soil, is swept off by the south-east wind blowing from False to Table Bay, before it ascends high enough to interfere with the visual ray. To how high a temperature the soil is occasionally heated, will be seen in Appendix (C).

(xx.) During the autumnal months of May, June, and July, when the weather is generally cool, and the nights cold, hot winds frequently set in from the north, usually in the night; at first moderate, and alternating with cold gusts from the opposite quarter, but rapidly gaining the prevalence, till, in a few hours, they attain the violence of a hard gale and glowing oven-like heat.† Thus they con-

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* The discs ill defined and agitated points, surrounded with distant halos. Where thrown out of focus *inwards*, the images, instead of circular discs, would present large central *vacuities*, absolutely void of light, round which a turban-fashioned phenomenon, in a constant state of vorticose motion, was seen. Occasionally, the image so thrown out of focus takes the form of a narrow circular arc, with a terminal concentration; when thrown out of focus *outwards*, a vivid central point, surrounded with an extensive circular area of light. The phenomena have manifestly a reference to the state of the air in the tube of the telescope, and at its aperture, and would seem to indicate the existence of a cone of heated air projecting beyond the aperture of the tube. The tube of a reflector being necessarily open at the mouth, ascending and descending currents of hot and cold air (usually rotating spirally) become established, and are very prejudicial to distinct vision. The remedy is obvious; viz., to dispense with a *tube* altogether, substituting for it a light, strong, inflexible framework of cast or wrought iron. In refracting telescopes, in which the air is completely enclosed, its circulation is not nearly so offensive.

† I annex the readings of a thermometer on the night of July, 1834, on the desk, in the open air, in the gallery of the 20-feet reflector. Minimum before midnight 40°.4. At midnight, the hot wind

tinue to blow, frequently for thirty-six or forty-eight hours, becoming at length cool, and finally settling into rain. Now it is not a little remarkable, that however unfavourable to vision this conflict of hot and cold currents is at the coming on of such a gale, no sooner does it become established than the images become concentrated, and settle down not unfrequently into excellent definition.

(xxi.) It is, however, in the cooler months, from May to October inclusive, and more especially in June and July, that the finest opportunities occur. The state of the air in these months, as regards definition, is habitually good, and imperfect vision is rather the exception than the rule. The best nights occur after the heavy rains which fall at this season have ceased for a day or two; and on these occasions, the tranquillity of the images, and sharpness of vision is such, that hardly any limit is set to magnifying power but what the aberrations of the specula necessitate.*

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set in, after a brief conflict, of the nature described in the text; the thermometer instantly rose to 50°. At

h m		°	h m		°	h m		°
1 39	A.M. it stood at	64.0	2 3	A.M. it stood at	69.0	2 38	A.M. it stood at	69.4
1 53	„ „	68.7	2 10	„ „	70.4	2 47	„ „	71.0
1 59	„ „	65.0	2 18	„ „	70.0	3 18	„ „	68.0
2 1	„ „	68.1	2 22	„ „	71.0			

Minimum before sunrise next morning, 60.0

* On such occasions, optical phenomena, of extraordinary splendour, are produced by intercepting the light of a bright star, by diaphragms pierced in regular patterns, and extending over the whole aperture of the telescope, such, for example, as large sheets of card-board or zinc, pierced by machinery (which gives perfect regularity), either with circular holes, uniformly disposed, or with any regular and not too complicated pattern. The appearances so produced (which strike every one who witnesses them with surprise and delight), though they may be seen whenever the air is in a moderately good state, are infinitely enhanced in their beauty by the perfect tranquillity which prevails on such occasions as these. They depend on the optical law of interferences; and many beautiful examples of their explanation on that principle, fully worked out in detail, will be found in M. Schwerd's treatise, "Die Beugungserscheinungen aus den Fundamentalgesetzen der Undulations—theorie analytisch entwickelt," &c. (Manheim, 1835).

The "triangular aperture," or diaphragm which admits the light through an opening concentric with the speculum in the form of an equilateral triangle, to whose use as a means of separating close double stars continual reference will be found in the following pages, affords an elegant example of this theory, in the sharpness of the central disc which it produces, and the absence of all appendages other than six perfectly straight delicate rays running off at angles of 60° from the disc. In a letter addressed, Dec. 24, 1834, to the late Captain B. Hall, of which I retain a copy, I find an observation of Canopus, with such an aperture, and a magnifying power of 1200, thus described:—"The disc is

(xxii.) Among the irregular and accidental optical effects of peculiar atmospheric conditions incident to the climate, there are one or two which seem deserving of especial notice. The first is that phenomenon which, when it occurs, I have designated by the epithet, the "nebulous haze." Its effect is to convert every star of the 9th magnitude and upwards, into a "nebulous star," meaning thereby a well-defined star, with a faint, nebulous photosphere of greater or less extent, according to the brightness of the star, surrounding it. This phenomenon occurs in a perfectly clear sky, free from the slightest suspicion of cloud. It comes on very suddenly and unexpectedly, and goes off as suddenly, lasting sometimes only a few minutes; at others, longer. Thus, in sweep 500, Oct. 5, 1834, it commenced at $22^h\ 4^m$ ST, when a star 7 m was observed to be surrounded with it, having come on quite suddenly, and continued to affect all the brighter stars until $22^h\ 54^m$, when it was quite gone, being described as extraordinary in intensity, and very troublesome during its continuance. From this time till $0^h\ 27^m$, all was clear, when it suddenly came on again, "in an instant. A star 7 m was quite free, but on drawing it back" (after it had left the field for re-examination), "it was found to be completely involved," the sky continuing all the while pure, so far as the naked eye could discern. Again, in sweep 598, June 18, 1835, we have "$15^h\ 37^m$ ST. A nebulous haze came on in an instant, extending to stars 9 m; yet the sky is as clear as ever, and the calm unbroken.—"$15^h\ 44^m$—(a star 6 m in the field). The nebulous haze is gone; it did not last two minutes."—"$16^h\ 23^m$. The nebulous haze came on again in a moment." Such remarks might lead to a suspicion of dew upon the eye-piece, or the breath of the observer settling on the glass; but repeated examination (the phenomenon being very common) has satisfied me that such is not the cause, but that it is really of atmospheric origin. Similar nebulous affections occur in our English climate; but it is their much greater frequency, and the suddenness of their appearance and disappearance, which forms so remarkable a feature at the Cape.

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an exact circle, and the six rays which such an aperture always gives, are perfectly straight, delicate, brilliant lines, like brightly illuminated threads, running far out beyond the field of view, and (what is singular) capable of being followed, like real appendages to the star, long after the star itself had left the field. In examining stars to see if they are close double, I always apply the triangular aperture. It reduces the discs to hardly more than a third of their size, and gives them a clearness and perfection incredible without trial."

(xxiii.) Another peculiarity which has frequently given rise to remark, is the opacity of cloud, as compared with what prevails in England. My Sweeping Registers, at Slough, are full of instances of double stars with small companions, clusters, &c. seen through cloud of considerable apparent density to the unassisted eye. Of this I have elsewhere stated remarkable instances. It was my usual practice there to continue sweeping during moderately-clouded intervals, for the sake of securing at least such new double stars as might occur, or obtaining micrometric measures of known ones placed on the working list. Such advantage could seldom be taken of clouded intervals at Feldhausen, and from the whole tenor of my experience of that locality, the impression remains of a very decided difference, in this respect, between the two stations.

(xxiv.) Meteorological observations of the barometer, thermometers, wet and dry, the actinometer, &c., with the usual record of weather, were made on the appointed *term-days*, or days of equinox and solstice; at first during thirty-six hours, subsequently, during twenty-four only, from hour to hour. These, however, are only valuable when taken in conjunction with others of the same kind; and having already been published in the pages of the *Athenæum*, and elsewhere, and received as much discussion as they have appeared to need, in a report which I had the honour to communicate to the British Association, for the advancement of science, and which has been published by that body, it has been thought unnecessary to reprint them.

(xxv.) It was, however, my intention to have placed on record, in this volume, the results of a great mass of Actinometric observation made since the year 1824 (at which epoch my attention was first directed to that method of ascertaining the intensity of solar radiation, which may not inaptly be termed dynamical, in contradistinction to the usual statical method by the observation of blackened thermometers, photometers, &c.) In addition to these, between five and six hundred sets of such observations obtained at the Cape, would, I supposed, have afforded valuable climatological data, and led to conclusions otherwise important. Unfortunately, the necessity of a correction by a variable factor depending on the temperature attained by the liquid enclosed in the cylinder of the instrument, had not been foreseen and provided for in any of these observations, and only became apparent when the omission was beyond remedy, viz., when the results were drawn out, and ready for press. They are, therefore, suppressed for the

present, leaving it to future examination to determine whether among them there may not be a portion, made under such circumstances, or registered in such a manner as to admit of the temperature and, therefore, the correction in question being ascertained and applied, and providing against a similar evil in future by a simple and easily applied addition to the instrument itself.

(xxvi.) The principles upon which the reduction of the observations made with the reflector is executed, are explained at large in the Appendix to my Catalogue of northern nebulæ, Phil. Trans. 1833, p. 482, et seq., and need not here be repeated. Only as respects the precession in Right Ascension, a slight change is introduced. That correction depending both on the Right Ascension and Polar distance of the object, would introduce, if attempted to be included in the general system of interpolation there adopted, a term of double entry which, however, since the zone swept is of small breadth, not exceeding 3°, may be resolved into two; the one a term of single entry, depending only on the time and expressing the precession for a constant polar distance, that of the middle of the zone; the other a correction of this for objects occurring out of the middle of the zone. This latter portion is a term of double entry; but it is necessarily of very small magnitude, seldom exceeding a few tenths of a second of time. In the system of reduction adopted in my former catalogue, this term is simply neglected; or the precession is regarded as the same throughout the breadth of the zone. Thus it becomes a mere function of the time of observation, and merges in the general correction for the time, to be interpolated as there explained. In the reduction of the present series of observations, this did not appear admissible, and it became necessary, therefore, to proceed somewhat differently, making a special exception of the precession in Right Ascension. This was done as follows: all the Right Ascensions of the zero stars were brought up to the beginning of the year nearest to the date of the observation, and the process, in its original form, followed out, as if to reduce the observations of the sweep to that epoch. The reduction (R) in this case, consists of two terms (A) and (B), of single entry, the former a function of the time, the latter of the polar distance. To bring these to the common epoch (1830) adopted throughout, the precession is thrown into the form P + p, where P is the precession for the middle of the zone, and p is the small correction to be applied to P to obtain the precession for any other point

out of the middle. Of these, P, being a function of the time, merges in A, and is added to, and so included in it; and p is calculated by a small table, of double entry, and applied to each star according to its proper amount and sign.

(xxvii.) Great and unavoidable delay having occurred in the publication of these pages, an opportunity has been afforded for a careful revision of the Catalogues subsequent to their printing off. In the course of this a considerable list of *corrigenda* has been accumulated, partly arising from error of the press, partly of copying, and partly of calculation. A few nebulæ and double stars also, which are not included in the Catalogues, having escaped the process of arrangement by which they were constructed, have been discovered in the sweeping journals, as well as some additional observations of others which are so included. These are appended accordingly to the list of corrigenda. Some errors which vitiate the letter-press are also noticed. They are few, and for the most part trivial, with the exception of two very obnoxious ones which the reader is requested to bear in mind, or correct for himself. In page 299, the major semiaxis of the orbit of γ Virginis is stated at $9''.69$, whereas it ought to be $3''.58$; and in page 368, equation (A), the numerical coefficient in the value of μ, instead of 3.1514, should be 2744.7.

(xxviii.) It remains to say something as to the mode of introducing this work into the world. To the munificent destination of his Grace the late Duke of Northumberland, of a large sum, in aid of its publication, it owes its appearance as a single and separate work, instead of a series of unconnected memoirs, scattered over the volumes of academical bodies. The lamented decease of that illustrious nobleman prevented his witnessing its final completion. His liberal intentions, however, have been fully carried out by the worthy successor to his titles and his spirit; whose kind and gracious interest in it, I should be wanting in all proper feeling, were I to omit this opportunity of acknowledging.

CHAPTER I.

OF THE NEBULÆ OF THE SOUTHERN HEMISPHERE.

OBSERVATIONS OF NEBULÆ AND CLUSTERS OF STARS TAKEN IN THE COURSE OF SWEEPING WITH THE TWENTY-FEET REFLECTOR.

I.—INTRODUCTION TO THE CATALOGUE OF NEBULÆ.

(1) The Catalogue of Southern Nebulæ, which forms the subject of this chapter, is similar, in every particular of its arrangement and construction, to my Catalogue of Northern Nebulæ and Clusters, published in the Transactions of the Royal Society, for 1833, and is reduced to the same epoch (1830·0), for the purpose of facilitating the union of the two catalogues into one general one. Like that Catalogue, it presents, assembled in one view, the reduced results of all the observations of each object which have occurred in the regular course of sweeping, in which either its place has been taken (however roughly), or in which any particular in its appearance or physical character has been noted; *without any selection of good, or suppression of discordant observations whatever.* To that work I shall, therefore, refer for the explanation, should any appear to be needed, of its arrangement, and of the purport of the several columns of which it consists. In effect, however, these sufficiently explain themselves, with exception of the abbreviations employed in the descriptions and columns of Synonyms, which it is necessary to repeat for the convenience of the reader, to whom they would otherwise be unintelligible without perpetual reference to another volume, which he might not have at hand. The dates of the several sweeps referred to in this and my former catalogues, will be found synoptically arranged in the table immediately appended to the catalogue now in question.

(2) North Polar distances are preferred to south, though most of the objects in the Catalogue are situated in the southern hemisphere, for the sake of uniformity, and for the maintenance of a general rule in applying precession; and for a similar reason Polar distance is preferred to declination, not merely because by so doing the signs + and — (fertile sources of mistake) are avoided, but also because all doubt or hesitation as to the sense in which the above-mentioned element is to be applied is thereby totally precluded, considerations of such moment as ought, I think, to lead to the universal disuse of declinations, and the adoption of *North* polar distances in their stead, in all astronomical catalogues henceforward to be published. It ought also to be mentioned that the "sweeps" referred to in the last column, as

those in which the observations occur, are numbered forward in continuation of my series of northern sweeps made at Slough; so that the Cape series (consisting of 382 sweeps) commences with sweep 429, and terminates with sweep 810. The general reference numbers in the first column are, in like manner, continued onward from No. 2307, the "omitted" nebula added after the 2306 regularly entered in order of R. A., in the Northern Catalogue.

The following is the system of abbreviations adopted:—

1. In the column of Synonyms—

The roman and arabic numerals (as I.45) occurring together, refer to the classes and numbers of nebulæ and clusters discovered by my Father, and published in his catalogues:

The letter B, followed by a number, refers to the "Brisbane Catalogue" of Stars, by the general number of that catalogue:

M, so followed, to Messier's Catalogue of Nebulæ:

Δ, „ to Mr. Dunlop's do. do., published in the Transactions of the Royal Society, for 1828:

h, followed by a number, to my Northern Catalogue.

(2.) In the column of Descriptions and Remarks—

B	denotes	Bright.	l	denotes	long, *or* a little.
b	———	brighter.	M	———	in the middle.
br	———	broad.	m	———	much.
c	———	considerably.	N	———	nebula.
Cl *or* cl	———	cluster.	neb	———	nebulous; nebulosity.
comp	———	compressed.	n	———	north.
D	———	double star.	p	———	pretty (not very); preceding.
d	———	diameter, distance.	pos	———	angle of position.
E	———	extended, elongated, *or* elliptic.	R	———	round.
e	———	extremely.	r	———	resolvable.
ee	———	excessively.	S	———	small.
F	———	Faint.	s	———	south, suddenly.
f	———	following.	st	———	stars.
fig	———	figure.	sc	———	scattered.
g	———	gradually.	v	———	very.
i *or* irr	———	irregular.	vv	———	very very (exceedingly).
L	———	large.			

*	Star.
⊕	Globular cluster.
O	Planetary nebula.
☾	Moon above the horizon.
☾ ☾	Moon very troublesome.

(3) In order to fix in the reader's mind the appearances represented by such combinations, occurring in the description of a nebula, as gbM (gradually brighter in the middle), pslbM (pretty suddenly a little brighter in the middle), &c.; it will suffice to refer to the explanatory plate (Pl. IX. Phil. Trans. vol. for 1833), and to the accompanying table of explanations,

p. 494, of the same volume, in which, however, an important erratum exists (viz., in the explanations of figures 16, 17, and 18, in which the abbreviations pmbM, mbM, and vmbM, are, by mistake, printed instead of the correct ones descriptive of those figures which are psbM, sbM, and vsbM, respectively).

(4) As an example of the use of these abbreviations in the description of a nebula, the following is taken from the preface to the Northern Catalogue above referred to.

"vB; vL; lE; vgpmbM; 50″ l; 45″ br; pos 29°·3 by microm. a * 9m. 45° np, dist. 80″," which expanded runs thus: — "Very bright; very large; a little extended; very gradually pretty much brighter in the middle; 50″ long; 45″ broad; angle of position (reckoned from the north and from a meridian in the direction north, following, south, preceding) measured 29°·3 by the micrometer. A star of the ninth magnitude is situated 45° north preceding the centre of the nebula and at a distance from it of 80″ (both by estimation)." *Measured* angles are always marked as above in degrees and decimals. Estimated ones without decimals.

(5) It will of course be readily understood that very great differences will occur in the descriptions of one and the same nebula taken on different nights, and under different atmospheric circumstances, as well as in different states of the mirror and the eye: nor will it at all startle one accustomed to the observation of nebulæ to see such an object described at one time as F; S; R (faint, small, round), and at another as B; pL; pmE; r; (bright; pretty large; pretty much extended; resolvable), &c. It is from a collection of all these descriptions that the true or final description has to be made out, in doing which it is to be recollected that the higher observed degrees of brightness, size, and extension are to be preferred in general to the lower ones, since atmospheric and other deteriorating causes always act in derogation of these qualities. For it appears to be a general law in the constitution of "extended" nebulæ, that their interior or brighter strata are more nearly spherical than their exterior or fainter; their ellipticity diminishing as we proceed from without inwards, a character, so far, in favour of a rotation on an axis, in the manner of a body whose component parts have such an amount of mutual connexion as to admit of such a mode of rotation, and of the exertion of some degree of pressure one on another. It by no means, however, follows, that such a mode of rotation can be regarded as demonstrated by the general phenomenon in question, since a system of internal movements among an assemblage of bodies perfectly disconnected, and acting on each other solely by attractive forces exerted at a distance, is at least conceivable, by which the same appearances to a remote spectator would be produced.

(6) The number of nebulæ and clusters comprised in the catalogue here presented, is 1708. Of these eighty-nine are identical with objects previously observed by myself at Slough, and which occur, in consequence, in my Northern Catalogue. In these cases it has been preferred to number them onwards, regularly in succession, as if now for the first time observed, rather than interrupt the succession by breaks or by the re-insertion of earlier numbers. The letter *h*, with its accompanying number in the column of synonyms, will point out the places in the former catalogue of such of these as occur there for the first time; and a reference to that catalogue being made will readily identify such others as have previously been described by my Father, or by Messier.

(7) Of the objects remaining, 135 are nebulæ and clusters of my Father's catalogues, now, for the first time, reobserved; 9 are Messier's, 5 of which are identical with objects catalogued

by Mr. Dunlop; and 206 others have also been identified, with more or less certainty (indicated by the absence or presence of the sign ?), with objects observed by Mr. Dunlop, and described in his Catalogue of Nebulæ. The rest of the 629 objects, comprised in that catalogue, have escaped my observation; and as I am not conscious of any such negligence in the act of sweeping as could give rise to so large a defalcation, but, on the contrary, by entering them on my working lists (at least, until the general inutility of doing so, and loss of valuable time in fruitless search, thereby caused it to become apparent), took the usual precautions to ensure their rediscovery; and as I am, moreover, of opinion that my examination of the southern circumpolar region will be found, on the whole, to have been an effective one, I cannot help concluding that, at least in the majority of those cases, a want of sufficient light or defining power in the instrument* used by Mr. Dunlop, has been the cause of his setting down objects as nebulæ where none really exist. That this is the case, in many instances, I have convinced myself by careful and persevering search over and around the places indicated in his catalogue.

II.—REMARKS ON THE CATALOGUE.

Of the degree of precision attributable to the places of the objects it comprises.

(8) A great number of the objects described in the following catalogue rely on single observations for the determination of their places. On this point a remark applies similar to that made on the same subject in my Northern Catalogue. To have secured two or more observations of each recorded nebula, would have required the whole surface of the heavens to have been swept at least four times over, on the system of observation pursued, viz., twice for discovery, and twice for verification and precise determination. In going a second time over the same ground, or even a third, in the richer regions of the heavens, it would have been very unadvisable to have arrested the sweeping process at each nebula detected in the first course of sweeps for the purpose of reobserving it; since, by so doing, the escape of every other object of interest (whether nebula, cluster, or double star), situated in the same zone, and within two or three minutes in right ascension, or even more, if the object reobserved were in any way interesting, would have been infallibly insured. With such an instrument as that which I employed, the place of an object cannot be determined with precision otherwise than by including it in a zone with sufficient zero stars to form a connected series: and to have carried out this process with that especial view (however desirable a thing in itself) would have required at least two, and probably three years of additional observation. As it was, it proved difficult, and, in fact, was not entirely accomplished, to go clearly twice over every part of the surface of the hemisphere; and, in consequence, anything approaching to such a systematic

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* A 9-inch Newtonian reflector, of 9 feet focal length, which, in point of light, would correspond to about one-seventh of that used in my sweeps. That such was its construction, I conclude from the mention of the *large mirror* in Philosophical Transactions, 1828, p. 113.

revision and reobservation of individuals was quite out of the question, unless in the case of objects of peculiar interest, which it would have been wrong not to have reobserved; or in those cases where, in crowded regions, it became absolutely necessary to multiply observations to avoid confounding together different individuals. Indeed, in the case of the two nubeculæ, and especially in that of the Nubecula Major, it was found necessary (such is their richness) to abandon the system of observing in zones of 3° in breadth, and to break them up into single degrees, so as to afford longer intervals between the transits; by which alone the observation of *all* their component nebulæ could be satisfactorily secured. However where, owing to the occurrence of important objects in a zone, it was thought advisable to go over it more than twice the opportunity of reobservation was of course seized, if tolerably certain that by so doing there were no risk of missing a nebula previously unobserved.

(9) Under these circumstances it is of course interesting to have some means of satisfying ourselves what confidence is due to a single observation of place. And this is afforded by the arrangement of the catalogue itself, in which the results of all the individual observations of each object, reduced independently and in almost every case (of necessity) by a different series of zero stars are confronted together. Without going into calculations on the theory of probabilities, it will be tolerably evident to any one who may cast his eyes over the columns of R A, and N P D, that, if we put aside loose objects such as large clusters of stars without any remarkable star centrally situated as a point of reference; or large ill-defined or irregularly shaped nebulæ; as well as observations marked as imperfect (by the sign $\pm$); cases are comparatively rare in which two observations of the same object differ by a whole minute in N P D, or by a quantity in R A, which, when converted into space according to the rule for convergence of meridians will give the same amount of discordance in the direction of the parallel. For the great majority of objects, therefore, the line of collimation of a telescope, pointed according to the mean of the observations recorded (when more than one), will strike upon a point of the heavens within the visible area of the nebula observed, even though its angular diameter should not exceed a single minute of a degree.

(10) In the cases of single observations, mistakes of reading and of reduction are the most dangerous, and to these the results of such observations are of course always more or less liable. I have every reason to hope that such mistakes have been very unfrequent. Whenever the smallest ground for suspicion has occurred, the reductions have been carefully re-examined. It was my intention to have gone over the whole of the reductions twice, and the work has been partly done, but I found myself unequal to the task of completing it. However, in order to form a notion on some better ground than mere general impression of the probable frequency of such mistakes, after drawing out in order of R A the fair copy of the reduced catalogue, I proceeded to compare the places of such nebulæ and other well-defined objects common to both the Northern and Southern Catalogues as have their places determined only by one observation in the latter. This afforded sixty-five comparisons in R A, and sixty-eight in N P D, in the course of which the errors detected in reading and reduction were as follows:—

Errors of reduction	In the Southern Catalogue	0
	In the Northern Catalogue	1

Errors of reading	1^m of Chronometer in R A	1
	1° in N P D	2
Mistakes of wire in observations of R A		0

The error of reduction thus detected affects the R A of the nebula h. 1540 of the Northern Catalogue which, in place of $13^h\ 0^m\ 30^s\cdot4$, should be $13^h\ 0^m\ 50^s\ 4$.—The chronometer readings are liable to an occasional error of 1^m when the second hand stands between 50^s and 60; and the minute so erroneously read is almost certain to be in excess. It is therefore a useful precaution, in looking out for a nebula or other object, whose place is settled only by a single observation, to presume the possibility of such an error, and to have the eye at the eye-piece a full minute before the registered time. The effect of an erroneous degree in Polar distance is much worse; as it necessarily causes the loss of the observation; but in all the above compared cases the instrument having been set to the places of the nebulæ by the working lists previously prepared, the *degree* has probably been read and registered more negligently than in the case of an unknown object, the attention having been concentred on the minutes and seconds. I may further observe that, in the very great number of cases where the same unknown nebula has been swept over several times, instances of misreading such as those above considered appear to have been very rare. In such cases they detect themselves, and though of course in registering them, in the catalogue form adopted, they have always been corrected when discovered, yet the fact of such correction being made is, in every instance, expressly noticed in the column of Remarks. Much care also has been taken to examine the catalogue for cases where two nebulæ *occurring in different sweeps*, and otherwise agreeing both in description and place, differ by a single minute of time in R A, or by a single degree in N P D (for in the system of observing adopted, a misreading of 2° is hardly possible). In such cases there necessarily arises a suspicion of identity which, when it occurs, is also noticed in the remarks annexed.

(11) Correcting these mistakes of reading, the actual discordances found to subsist between the two Catalogues run as follows: —

Discordances in R A.

	s		s	
Above	0·0	but not exceeding	1·0	— 32
„	1·0	„ „	2·0	— 14
„	2·0	„ „	3·0	— 11
„	3·0	„ „	4·0	— 8
„	4·0	„ „		— 0
				65

Discordances in N P D.

Above	0″	but not exceeding	20″	— 34
„	20″	„ „	40″	— 20
„	40″	„ „	60″	— 5
„	60″	„ „	80″	— 5
„	80″	„ „	90″	— 4
„	90″	„ „		— 0
				68

(12) Although the number of observations thus compared is not large, yet it suffices to afford a reasonable presumption (taking the error at half the discordance) that the place of a well-defined nebula, determined by a single observation, will seldom be found in error to the extent of 30″ of space in the direction of the parallel, or of 45″ in that of the meridian. The entry of a known and expected nebula to which the telescope has been set into the field of view bisected by the horizontal wire is a thing of no uncommon occurrence.

Explanation of the figures referred to in the Catalogue of Southern Nebulæ and clusters, with more detailed descriptions and monographs of some of the most remarkable nebulæ of the Southern Hemisphere.

(13) Fig. 1, Plate II.; M. 17=h. 2008; R A 18^h 11^m N P D. 106° 15′. This very remarkable object is figured in my Northern Catalogue (fig. 35), but owing to the deficiency of Micrometrical measures for laying down the stars, its form is far from accurately expressed in that representation. In particular the large horse-shoe-shaped arc which forms so striking and conspicuous an appendage to the bright oblique streak observed by Messier at its preceding termination, is there represented too much elongated in a vertical direction and as bearing altogether too large a proportion to that streak, and to the total magnitude of the object. The nebulous diffusion too, at the preceding end of that arc, forming the preceding angle and base line of the capital Greek *omega* (Ω) to which the general figure of the nebula has been likened, is now so little conspicuous as to induce a suspicion that some real change may have taken place in the relative brightness of this portion compared with the rest of the nebula; seeing that a figure of it made on the 25th of June, 1837 (on which occasion other details presently to be noticed were well seen, and for the first time distinctly delineated), expresses no such diffusion, but represents the arc as breaking off before it even attains fully to the group of small stars at the preceding angle of the Omega. Neither is the smaller of the two nebulous knots at its following angle close adjoining to the small star there situated so conspicuous as to have attracted particular notice either on that occasion, or on the 13th August, 1835, when a pretty elaborate drawing was made of all the then known parts of the nebula, and a number of measures taken with the twenty-feet position micrometer with a view to the construction of a correct monograph of it.

(14) Under these circumstances the argument for a real change in the nebula might seem to have considerable weight. Nevertheless they are weakened or destroyed by a contrary testimony entitled to much reliance. Mr. Mason, a young and ardent astronomer, a native of the United States of America, whose premature death is the more to be regretted, as he was (so far as I am aware) the only other recent observer who has given himself, with the assiduity which the subject requires, to the exact delineation of nebulæ, and whose figures I find at all satisfactory, expressly states (Mem. American Phil. Soc. vol. vii. Art. xiii. p. 177) that *both* the nebulous knots were well seen by himself and his coadjutor Mr. Smith, on the 1st August, 1839, *i. e.* two years subsequent to the date of my last drawing. Mr. Mason also declares the upper and larger knot to be irresolvable by his telescope (a reflector of 12 inches aperture and 14 feet focal length constructed by himself). In this particular my observations of 1835 and 1837, so far agree that its resolvability is not mentioned in words or indicated in the diagrams made on those occasions. And, with respect to the diffusion of the nebula among the group of stars at the preceding angle and along the base-line of the Omega, it is represented as tolerably conspicuous in his figure—for which reason, and because it was decidedly noticed as a feature in my earlier observations, I have retained both it and the lesser knot in my present figure, considering the negative evidence of their having escaped delineation on those two nights as outweighed by the positive testimony in favour of their

existence both at an earlier and a later epoch. Neither Mr. Mason however, nor any other observer,* appears to have had the least suspicion of the existence of the fainter horse-shoe arc attached to the *following* extremity of Messier's streak. It was seen on both the nights in question, but only delineated in its true form and magnitude on the latter. It merits, however, a more particular attention than I was then able to bestow on it, as it is possible that yet other convolutions may exist. I should observe that the three stars which mark its extremity are *not* micrometrically laid down.

(15) The stars visible in this nebula are for the most part too small to admit of their differences of R A and N P D being taken with the equatorial micrometer conveniently. Accordingly only three or four have been so laid down. The more conspicuous of the remaining ones down to the 12th, and one or two of smaller magnitudes have been determined by triangulation from these by angles of position taken with the 20 feet position micrometer. Several of these angles were measured in England, the rest at the Cape, on the 13th August, 1835. No reason existing for preference, the means of all the observed positions belonging to the same pairs of stars were adopted, and the whole system of angles projected on a chart

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* Dr. Lamont, in his Academical Thesis on Nebulæ, read before the Bavarian Academy, Aug. 25, 1837, has given a figure of this nebula, accompanied with a description. In this figure the nebulous effusion at the preceding angle, and along the preceding base line of the Omega, is represented as very conspicuous; indeed much more so than I can persuade myself it was his intention it should appear—the engraver having probably overdone it. However, it justifies my retaining it. He has not given any indication of the additional loop at the following end of Messier's branch. He also remarks, as Mr. Mason has done, on the irresolvability of the insulated knot; and, as observed in the text, I am not disposed to insist on its being resolvable. He accounts, however, for my having considered it as such, by the existence of two very minute stars in it. These have escaped my notice. I ought here to observe, that Dr. Lamont appears to have misconceived my meaning in that part of the description of this nebula, appended to my Northern Catalogue, where it is said that, "With a view to a more exact representation of this curious nebula" (*more exact, that is to say, than the figure there given*), "I have at different times taken micrometrical measures of the relative places of the stars in and near it, by which, *when laid down* as in a chart, its limits *may be traced* and identified, *as I hope soon to have a better opportunity* to do," &c. Dr. L. interprets this passage to mean, that the figure in that catalogue was based upon a series of micrometrical measures, whereas he finds material discordances between that figure and his own (no doubt accurate) measurements. But this is neither the purport of the passage cited, nor its plain grammatical sense. A few, but very rude and imperfect micrometric measures, no doubt *were* used in constructing that figure; but for the most part it is a mere eye draft, and, as now appears, considerably distorted. Though not relevant to the immediate subject, I will take this opportunity (as another may not occur) to notice a point of some interest, which has arisen on a comparison of Dr. Lamont's figure and description of the Planetary Nebula h. 2037, with my own observations. According to Dr. L., that nebula has two small stars nf, one upon the very edge, the other removed from it by $\frac{3}{4}$ of the diameter of the nebula. The former *is* the star observed and described by me in my catalogue, but it is there called 11 m, whereas, on referring to the original observation, I find the figures to be 15, the five being obscurely written over a 1 as a correction. No engraving was made of this nebula, but in both the sweeps where it was observed diagrams were made, which agree in representing this star, *not*, as in Dr. Lamont's figure, *precisely* on the edge, but at a distance from it about $\frac{1}{6}$, or $\frac{1}{5}$ at most, of the diameter. The *other* star was not marked on either occasion. Being considerably more distant, it was passed over among the "many other stars in the field." My reason for drawing attention to this point is that, from all the circumstances of the case, there can be very little doubt of a relative motion of the objects *inter se*; and it will be therefore interesting to re-observe them, which I trust Dr. L. will do.

by means of a protractor. Thus, from the equatorially determined stars adopted as a basis of projection others were derived by the intersection of their directions, and from these again others, and so on; using always the best trigonometrical combinations the respective cases would admit, and adjusting cases of discordant intersections as they arose, on an impartial consideration of their merits.* From the stars so laid down by triangulation, others depending only on eye-drafts were then inserted on the chart according to their configurations. Finally, the differences of R A and N P D of the stars of these two latter classes were read off from the chart by the aid of diagonal scales, and the whole entered in a catalogue; which done, the nebula was then worked in upon the chart as carefully as possible according to the united evidence of all the drawings and diagrams at any time procured of it or of any of its parts.

(16) The following is the Catalogue in question, in which the first column contains the number for future reference—the second, letters for more convenient citation, the third the magnitude assigned to the star on a comparison of all the observations neglecting half magnitudes below the 8th. The fourth column contains the difference of right ascension in seconds of time, and the fifth that of North Polar distance in parts of the equatorial wire micrometer, (1000 parts=4′ 0″.4.) from the chief or Zero star, which in this case is the conspicuous star a little preceding the summit of the brighter horse-shoe. Lastly, the sixth column contains the classes to which the determinations of the stars belong in respect of probable precision; class 1, containing stars determined by differences directly observed with the equatorial; 2, stars projected by triangulation as above described, and 3, stars inserted from eye-drafts. Dots attached (:) denote want of precision.

CATALOGUE OF THE STARS LAID DOWN IN THE DRAWINGS OF M 17 = h. 2008.

No.	Letter.	Mag.	x ΔRA from a. Sec. Dec.	y ΔNPD from a. Parts.	Class.	No.	Letter.	Mag.	x ΔRA from a. Sec. Dec.	y ΔNPD from a. Parts.	Class.
1	ρ	14	− 7.1	− 720	2	23	η	10	+15.9	−1530	2,3
2	ι	12	− 6.1	− 840	3	24	θ	12	+16.1	−1755	3
3	ξ	17	− 5.3	− 910	3	25	δ	9	+17.2	−1640	2
4	χ	14	− 4.1	− 340	2	26	e	8	+19.3	+1450	2
5	τ	14	− 4.0	− 745	3	27	n	13	+21.0	−1710	3
6	γ	11	− 3.6	− 970	1	28	v	15	+22.0	− 110	3 :
7	c	10	− 1.8	+1215	2	29	w	15	+22.7	− 220	3 :
8	o	13	− 1.2	− 960	2	30	s	13	+27.1	−1180	3 ::
9	π	15	− 1.0	− 825	3	31	b	11	+28.2	+ 560	2
10	ζ	11	− 0.9	+ 480	1,2	32	d	14	+28.3	+ 80	3 .
11	α	9	. 0.0	0	1	33	σ	12	+29.0	− 880	3 ::
12	g	16	. 0.0	− 330	3	34	l	11	+33.9	−1450	3 ::
13	ν	13	+ 0.5	− 510	2	35	a	13	+35.2	− 360	2
14	f	9	+ 4.4	+1805	2	36	υ	12	+37.2	−1750	3 :
15	μ	13	+ 4.9	− 660	2	37	k	10	+39.8	−1700	2
16	κ	12	+ 6.4	+ 205	2	38	t	14	+40.5	−1330	3 ::
17	λ	13	+ 7.3	− 840	2	39	m	11	+41.4	−1300	3 ::
18	ε	11	+ 7.3	− 470	2	40	u	. .	+44.9	−1000	3 ::
19	ω	15	+ 7.5	− 630	2	41	h	11	+45.0	− 640	3 ::
20	β	10	+ 8.2	− 275	1	42	p	9	+59.0	+ 325	3 ::
21	φ	12	+ 8.6	+ 560	2	43	q	10	+63.6	+ 415	3 ::
22	ψ	16	+12.9	+ 130	3	44	r	11	+67.8	+ 650	3 ::

* When a star is determined, in this mode of proceeding, by three or more intersecting lines which do not meet in a single point, bad trigonometrical combinations must be disregarded, and the centre of gravity of the intersections afforded by the good ones only taken.

Fig. 2, Plate II. H. IV. 41=V. 10, 11, 12=h. 1991. R A. 17^h 52^m; N P D 113° 1′.

(17) I have been rather unfortunate in my figures of this nebula. That given in my Northern Catalogue (fig. 80) is not to be taken as more than an attempt, and that a most rude and imperfect one to show the situation of the fine triple star in its centre with respect to the nearer portions of the three principal surrounding nebulous masses. It is stated in the observations recorded in that Catalogue, that a careful drawing made of the nebula was lost, and that the figure there given was constructed from much less elaborate sketches (in fact the rudest imaginable) aided by memory. The drawing from which my present figure is constructed, was the work of a single night only (about the beginning of August 1835, for it bears no date, though the time can be ascertained nearly from other circumstances). No previous micrometrical measurements however having been procured of the stars involved and adjacent, wherewith to prepare a "working skeleton" for laying down the nebula, both nebula and stars were worked in by the unassisted eye, and although a series of angles of position among the principal stars was taken after the completion of the drawing (all single measures), their results when subsequently projected, exhibited some material disagreements from the eye-draft in respect of the situations of several of them inter se, and in one instance (that of the star marked κ in the Catalogue annexed) the situation so projected proved quite irreconcileable with the eye-draft, a discordance which however disappeared on supposing an error of 5° to have been committed in one of the angles of position (from β) by which it had been determined. However as (allowing such an error to have been committed) the angles in question sufficed to fix the relative places of the six chief stars α β ϵ η θ κ by direct intersections, and of ζ ι λ ρ υ ϕ χ, each by a measured position from β combined with undoubted allineations among the other stars, on the whole in a tolerably satisfactory manner, there was little difficulty in inserting the other stars of the eye-draft so as to preserve their configurations, and thence to lay down the nebula upon them without doing violence either to its general aspect, or to any important feature. Had the discordance in question been detected before the final removal of the telescope it would have been easily rectified, but the original drawing having been considered at the time satisfactory, it was put aside and not subsequently re-examined and compared with the nebula itself, a circumstance the more to be regretted as this wonderful object, independent of its intrinsic interest, has also been made a subject of especial and elaborate examination by Mason in his paper already cited, illustrated with a well-executed figure constructed from observations in the year 1839.

(18) On comparing our figures, they will be found to agree in every essential particular allowing for the difference of light between reflectors of 12 and 18 inches aperture, with one rather remarkable exception, viz., in the form of the southern mass of the trifid nebula and the character of the curvature of the three paths or avenues which lead up to the triple star. Mason represents these avenues as free from any abrupt change of direction, the northern and the preceding of them branching out with an easy and graceful bifurcation from the southern: whereas my figure whose correctness in this respect I cannot doubt, gives to the preceding avenue a remarkably sudden and uncouth flexure, like a gnarled branch of an oak, just at its divergence from the other two. The southern nebulous mass, in my figure, has a considerably wider extension towards the preceding side than in Mason's which represents it as

nearly round; but as this portion is very faint there was probably not light enough in his telescope to render the whole visible.* On comparing his stars with mine as laid down from the following catalogue, some will be found to which I have none corresponding (and *vice versa*), and it is not unlikely that many more may have escaped my notice, not for want of power in the telescope to show them, but for want of a sufficiently prolonged and methodical scrutiny specially directed to this point. Such objects in fact cannot be adequately described and figured in a single night. They require repeated examination and breaking up into triangles to be explored in detail, and the near proximity of this in particular to another extensive and complex nebula (Messier's 8th), from which it is distant hardly more than a degree, renders a fuller examination of it desirable, with a view to the possibility of tracing a nebulous connexion between them.

CATALOGUE OF THE STARS LAID DOWN IN THE FIGURE OF H. IV. 41 = h. 1991.

No.	Letter.	Mag.	x ΔRA from α in time. Sec. Dec.	y ΔNPD from α in Mic. Pts. Parts.	Class.	No.	Letter.	Mag.	x ΔRA from α in time. Sec. Dec.	y ΔNPD from α in Mic. Pts. Parts.	Class.
1	ε	12	− 8.0	− 875	2	15	θ	11	+ 7.1	− 290	2
2	c	15	− 6.9	− 390	3	16	ι	13	+ 7.2	−2980	2.3
3	ρ	13	− 6.4	−2230	2.3	17	κ	12	+ 7.6	+ 280	2.3
4	χ	14	− 4.1	−2460	2.3	18	ζ	11	+ 7.6	−1000	2.3
5	a	15	− 4.1	+ 300	2.3	19	ο	13	+ 7.6	−1490	3
6	γ	8	− 0.4	+ 50	3	20	β	6.7	+ 8.8	−1845	2
7	b	15	− 0.3	− 830	3	21	π	13	+ 9.0	−1430	3
8	α	6.7	0.0	0		22	σ	13	+ 9.0	−3180	3
9	δ	13	+ 0.1	− 25	3	23	τ	13	+11.7	−3340	3
10	ν	13	+ 1.8	− 360	3	24	η	11	+11.9	− 450	2
11	ψ	13	+ 2.9	− 535	3	25	λ	12	+14.4	+ 540	2.3
12	ξ	13	+ 4.3	−1510	3	26	υ	13	+21.5	−2400	2.3
13	μ	13	+ 6.6	− 115	3	27	φ	13	+22.8	−2970	2.3
14	ω	14	+ 7.0	+1230	3						

Fig. 3, Pl. II. V. 30; C Orionis; R A $5^h\ 27^m$; N P D 94° 57′.

(19) Although I have not succeeded in tracing any nebulous connexion between this nebula and the great one about θ Orionis, yet as their distance is not much more than half a degree, it not improbably forms part of one great nebulous system extending southwards through and beyond that nebula as far as ι Orionis up to which star a pretty conspicuous branch of the great nebula runs. More powerful telescopes than mine must decide this point. Meanwhile, as this nebula has never before been figured, and offers much that is remarkable in its form and relation to the involved stars, I have bestowed some care in getting at least a tolerably correct representation of it. My figure is constructed from two drawings made on the 5th of November, 1834, and the 29th January, 1835, and from a series of equatorial differences of R A and N P D of the principal stars involved in it (those of Class 1, in the accompanying Catalogue)

* A mistake of importance, as it enlarges the apparent scale of his figure in the direction of the meridian, has been committed by Mr. Mason's engraver. The parallels of declination in both the figures of this nebula which are marked 22° 45′, ought to have been marked 22° 50′. The places of his stars being determined by numerous and elaborate micrometrical measures, are no doubt more correct than mine.

obtained on the 7th and 9th January, 1835, which, though less numerous than might have been desired, have afforded a sufficient basis of reference for laying down the others from the means of readings taken on both the eye-drafts which agree sufficiently well with each other to claim for the stars marked as of class 2, a degree of exactness not inferior to what would have been afforded by direct measures with the position micrometer.

CATALOGUE OF THE STARS LAID DOWN IN THE DRAWING OF V. 30.

No.	Letter.	Mag.	x ΔRA from α. Sec. Dec.	y ΔNPD from α. Parts.	Class.	No.	Letter.	Mag.	x ΔRA from α. Sec. Dec.	y ΔNPD from α. Parts.	Class.
1	ι	10	−28.8	−1055	2	14	μ	12	− 0.2	+ 725	2
2	ξ	13	−19.5	− 842	2	15	α	6	0.0	0	..
3	ρ	14	−19.3	− 238	2	16	ο	13	+ 1.9	− 752	2
4	γ	8	−18.8	−1560	1	17	τ	14	+ 2.8	− 818	2
5	λ	12	−17.6	−1735	2	18	υ	14	+ 4.6	−1308	2
6	θ	10	− 9.8	+ 359	1	19	ν	12	+ 6.0	+1305	2
7	κ	11	− 9.0	−1265	2	20	ε	10	+ 8.4	+ 969	1
8	η	10	− 7.7	−2198	2	21	ψ	15	+ 8.6	−1702	2
9	ζ	10	− 7.2	−2295	2	22	δ	9	+10.5	− 65	1,2
10	a	16	− 6.3	−1050	2	23	β	7	+16.8	+ 244	1
11	b	16	− 5.1	−1210	2	24	χ	15	+19.0	−2140	2
12	π	13	− 1.5	+ 155	2	25	φ	14	+28.8	+ 28	2
13	σ	14	− 1.0	−1595	2	26	ω	..	+40.0	+ 45	2

The stars η and ζ form the double star Σ. 746; a is identical with c^1 Orionis = A S C. 680; and β with c^2 Orionis = V. 154. Piazzi. Just beyond the limit of the figure occurs the star V. 144 Piazzi, whose differences in R A and N P D from a are — 59^s. 5 and — 436 *Pts.*

Fig. 4, Pl. II. 30 (Bode) Doradûs,=Lac 449. Neb.=B. 1038=Δ. 142=h. 2941.
R A 5^h 40^m: N P D 159° 11′

(20) This is one of the most singular and extraordinary objects which the heavens present, and derives no small addition to its intrinsic interest from its situation, which is among the thickest of the nebulæ and clustering groups of the greater Nubecula, of whose total area it occupies about one five-hundredth part. For these reasons, as well as because its real nature has been completely misunderstood, and its magnified appearance so strangely misrepresented in the only figure which I am aware to have been made of it as to convey an entirely erroneous impression both of its form and structure; I have taken great pains to give as nearly as possible a perfect representation of it as it appeared in the twenty feet reflector on a great many occasions, but more especially on the 29th November, 1834, when a "very careful drawing" was made of it by the eye alone, unaided by any micrometrical measures; and on the 21st and 22nd December, 1835, when the nebula was worked in from the telescope on a "skeleton" previously prepared by an approximate reduction of the micrometrical measures of its principal stars, forming a chart, with a system of triangles, for its reception and for that of minute stars not susceptible of micrometric measurement, or not considered as of sufficient importance to be so measured. This is the only mode in which correct monographs can be executed of nebulæ of this kind which consist of complicated windings and ill-defined members obliterated by the smallest illumination of

the field of view; and in which the small stars, when very numerous, can be mapped down with tolerable precision.

(21) The following catalogue contains all the stars which I have been able distinctly to perceive within the area occupied by the nebula and nearly adjacent to it. Owing to the

CATALOGUE OF THE STARS LAID DOWN IN THE MONOGRAPH OF THE NEBULA h. 2941 = 30 (BODE) DORADUS, &c.

No.	Letter.	Mag.	x Co-ord. from α in parall. Sec. Dec.	y Co-ord. from α in merid. Sec. Dec.	Class.	No.	Letter.	Mag.	x Co-ord. from α in parall. Sec. Dec.	y Co-ord. from α in merid. Sec. Dec.	Class.
1		13	−382.0	−260.0	2	54	ξ	12	− 19.3	−395.1	2
2		14	−367.0	−209.0	3	55	o	13	− 16.0	+133.5	1
3		..	−363.5	+238.5	3	56		14	− 11.4	−284.4	2
4		..	−358.0:	−185.0:	3	57		17	− 10.3	−186.2	3
5		15	−355.5	+133.3	3	58		13	− 9.8	− 6.9	2
6		14	−353.0	+ 61.7	3	59		14	− 9.4	−266.7	3
7		14	−345.0	+101.3	1	60	ζ	10.11	− 6.7	− 52.1	1
8		..	−338.9:	−148.0:	3	61		12	− 4.2	− 68.9	2
9	ψ	14	−331.0	+264.0	3	62		14	− 2.8	−339.6	2.3
10		14	−326.8	+121.9	3	63		16	− 2.5	− 6.0	2
11		..	−325.0:	−222.0:	3	64		15	− 0.7	+ 13.5	2
12	χ	12	−298.1	+284.0	2	65		13	− 0.5	− 22.0	2
13	ι	11	−295.5	− 92.8	1	66	α	9	0.0	0.0	1
14	ϕ	12	−292.5	+198.5	1	67		14	+ 4.7	− 60.0	2.3
15		15	−289.5:	−278.6	3	68		12	+ 7.0	−334.5	2
16	ε	11	−289.1	− 39.1	1	69		14	+ 9.7	− 8.7	2
17		14	−281.7	+204.3	2.3	70		13	+ 16.3	− 15.2	2
18		16	−280.8	+ 26.9	2	71		12	+ 21.0	+ 20.0	2
19		14	−264.5	+231.5	3	72		14	+ 41.4	+ 44.0	2
20		10.11	−264.2	−584.3	2	73		17	+ 44.0	− 16.5	2.3
21		17	−264.2	+262.0	3	74	δ	10.11	+ 45.2	−239.0	1
22	ω	12	−262.0	+247.0	3	75		17	+ 47.3	− 1.0	2.3
23		16	−261.0	+184.5	3	76		17	+ 54.0	+ 17.0	3
24		15	−248.5	+236.9	3	77	γ	10.11	+ 55.1	+122.8	1
25		15	−239.2	+173.5	3	78		12	+ 67.8	−542.2	2
26		16	−237±	+394±	3	79		15	+ 70.2	−135.9	3
27		15	−233.8	+155.2	3	80		12	+ 76.9	+ 91.7	2
28		15	−176.2	− 2.5	3	81	λ	11.12	+ 79.5	+ 1.0	1
29	β	10	−174.0	+ 22.9	1	82		17	+ 88.8	−524.2	3
30		15	−165.1	+ 36.2	2.3	83		15	+ 90.0	+ 66.6	2.3
31	θ	11.12	−158.0	−294.2	2	84		17	+ 95.8	−505.2	3
32		14	−154.5	− 5.1	3	85		17	+100.8	−542.2	3
33	ρ'	13	−152.4	−123.8	2	86	σ	12	+112.7	−110.2	2
34	ρ	13	−151.4	−129.8	1	87		10.11	+127.0	+434.0	2
35	ρ''	13	−149.3	−119.8	2	88	ν	12	+146.8	−240.8	1
36	π	14	−147.6	+115.5	2	89		16	+152.8	−232.8	3
37	ρ'''	13	−142.9	−127.8	2	90		17	+163.8	−402.7	2.3
38		15	−133.4	−147.3	3	91	μ	12	+197.7	+ 16.0	1
39		..	−125.0	−489.0	2	92		15	+198.8	+340.1	3
40		16	−124.5	− 3.1	3	93		..	+227.0	+481.0	3
41		17	−121.0	+291.0	3	94	τ	14	+230.0	− 10.0	2
42	κ	12	−103.6	− 56.1	2	95		17	+246.5	+190.0	2
43		15	−100.5	+ 78.7	2	96		12	+246.8	+315.1	1
44		..	− 83.6:	−465.5:	3	97	υ	15	+255.7	− 47.5	2
45	η	11.12	− 75.0	−288.0	1	98		13	+271.8	−330.7	2.3
46		16	− 42.3	− 85.8	2	99		10.11	+280.0	−557.0	2
47		13	− 37.2	− 68.9	2.3	100		13	+283.8	−343.7	3
48		13	− 32.4	− 2.9	2	101		16	+301.0	+349.4	2.3
49		17	− 32.0	+222.0	2	102		13	+310.8	+328.9	2
50		14	− 30.4	−278.5	2	103		13	+317.3	+341.9	2
51		18:	− 26.5	−126.0	2	104		17:	+322.5	+330.1	2.3
52		13	− 24.0	− 56.5	2.3	105		17	+373.6	+193.4	2.3
53		13	− 22.8	−162.4	3						

convergence of the meridians so near the pole, they are laid down in the figure, and entered in the catalogue, not according to differences of R A and polar distance expressed as usual in time and in parts of the equatorial micrometer — but according to the values x and y of rectangular co-ordinates measured on the parallel and meridian passing through the central star, and both expressed in seconds of absolute angular measure.

(22) The first class of stars in this catalogue comprises those which have been determined by the combination of direct measures of differences of R A and N P D taken with the equatorial with angular measures of position taken with the 20 feet micrometer, or by such only of the latter description of measures as I consider on the whole, from their number and satisfactory coincidence of their results, equal in weight to such direct determinations. The second class contains stars determined by the projection of angles of position only but less numerous and accurate than those of class 1, or in which angles of position not alone sufficient for determining the co-ordinates have been combined either with observed differences of R A, or with distances obtained from configurations with stars of class 1, capable of affording a considerable degree of exactness. Class 3, contains stars inserted on the "skeleton" by the eye, and whose co-ordinates therefore will be more or less exact according to their situation, whether favourable or unfavourable for good configurations. Some of these which, owing either to the employment of a measured angle or to some other favourable circumstance, appear to claim a higher degree of confidence, are indicated by 2.3 in the column of classes.

(23) The stars thus scattered over the area occupied by this nebula may or may not be systematically connected with it, either as an individual object, or as part of the vast and complex system which constitutes the Nubecula. In respect of their arrangement there is nothing to distinguish them from those which occupy the rest of the area covered by the nubecula, in which every variety of condensation and mode of distribution is to be met with. The nebula itself (as seen in the 20 feet reflector) is of the milky or irresolvable kind—quite as free from any mottling or incipient stellar appearance as any other nebula which I can remember to have examined with that instrument. Its situation in the Nubecula is immediately adjacent to two large and rich clusters (h. 2922. and h. 2931.). Mr. Dunlop remarks that "the 30 Doradûs is surrounded by a number of nebulæ of considerable magnitudes, 9 or 10 in number, with the 30 Doradûs in the centre," of which nebulæ he gives a figured representation. For what objects these can be intended I am quite at a loss to conjecture, unless they be the brighter portions of the nebulous convolutions seen without their connecting embranchments. But with this supposition their relative situations, intensities, and magnitudes in the figure alluded to, so far as I am able to judge, appear irreconcilable.

Fig. 1, Plate I. Messier. 8 = h. 3722; R A. $17^h\ 53^m\ 27^s$; N P D. 114° 21′ 16″.

(24) This fine and complicated nebula is, as already remarked, a near neighbour of H. IV. 41, and is also closely adjacent to, and partly intermixed with, the cluster h. 3725, which follows the chief star in the nebula (9 Sagittarii) about 1^m in R A, nearly on the same parallel. It is also preceded about 4^m of time by a large and loose, but very rich cluster (h. 3717) about

a quarter of a degree to the south; so that its neighbourhood is in a high degree rich and interesting. Its brighter portion may be described as consisting of three pretty distinct streaks, or masses of nebula of a milky or irresolvable character, arched together at their northern extremities so as to form some resemblance to the arches of an italic letter *m* very obliquely written, and this is the aspect under which it strikes the eye on a cursory view. On closer attention these streaks are seen to be connected and run into each other below (or to the south) by branches and projections of fainter light, and to form three distinct basins, insulating oval spaces, one entirely, the others comparatively dark. Northwards, a great effusion of faint nebula runs out, insulating a larger and more ill-defined basin of great extent and irregular form which in some measure communicates with the best-defined and darker of the three oval spaces already spoken of. The preceding and brighter of the three streaks is very remarkably distinguished by a vivid and abrupt concentration of its light to a kind of elongated nucleus, just following a star (*n*, No. 36 of the accompanying catalogue) and so near it that on a careless view it might be regarded as having that star for its centre of condensation. But with moderate attention this is seen not to be the case. The proper nucleus is decidedly not stellar, and resembles much more that of the nebula in Andromeda than any other I can call to mind as a term of comparison. The whole area occupied by this nebula, taking in all the convolutions I have been able to trace, is about one-fifth of a square degree.

(25) In delineating this object every attention has been paid to exactness. As the stars in it are numerous and many of them conspicuous in the equatorial, the relative places of these were in the first instance ascertained by between 400 and 500 differential observations of R A. and N P D taken with that instrument on the 6th, 11th, 12th, and 15th of September 1836, and the 13th and 26th of July 1837. From these measures skeleton charts were then constructed, and being divided into convenient triangles, the nebula was worked in upon them and the smaller stars inserted within the triangles on the nights of September 4th and 5th, and October 3rd, 1837, and on one previous occasion, about the same time, but of which the date is not specially recorded. On the 6th September 1836, also, a series of angles of position among the principal stars were also taken with the 20 feet micrometer. From the whole evidence thus afforded, and by the collation of a diagram (not of much value) made in sweep 474, the figure of the nebula now presented to the public, and the subjoined catalogue of stars observed in it have been constructed. In all these figures of nebulæ I have held it unadvisable to disfigure the engraving with letters or numbers pointing out the stars. It is easy for any one who may wish to go into any minute comparison of them with the actual objects to take up the places of the stars on tracing paper, and then by affixing to them their proper references by the catalogue to form a skeleton chart adapted for his purpose. I should observe that in this catalogue and figure only such portion of the cluster VI. 13, as is intermingled with the nebula is included: neither has attention been paid to the mapping down of stars out of the area occupied by it or closely adjacent.

The stars A, D, and X of the catalogue are identified respectively with A S C. 2074 (9 Sagittarii), A S C. 2078, and A S C. 2067 (7 Sagittarii).

CATALOGUE OF THE STARS TO ACCOMPANY THE MONOGRAPH OF THE NEBULA M. 8 = h. 3722

R A OF THE STAR A (= 9 SAGITTARII) $17^h\ 53^m\ 27^s.2$ N P D 114° 21′ 16″.

No.	Letter.	Mag.	x ΔRA in time from A. Sec. Dec.	y ΔNPD in Parts from A. Parts.	Class.	No.	Letter.	Mag.	x ΔRA in time from A. Sec. Dec.	y ΔNPD in Parts from A. Parts.	Class.	No.	Letter.	Mag.	x ΔRA in time from A. Sec. Dec.	y ΔNPD in Parts from A. Parts.	Class.
1	X	6	−60.97	−1262	1	63		15	+ 6.4.	−2040	3	125		16	+32.7.	+1410	3
2	τ	10	−58.92	− 378	1	64		16	+ 7.8.	+1320	3	126	C	8	+33.05	+ 404	1
3		12	−57.5.	− 920	3	65	R	13	+ 8.62	+1235	1	127	c	11	+33.09	− 190	2
4	υ	12	−54.15	− 630	2	66	h	12	+ 9.0.	+ 500	2	128		12	+34.0.	+ 310	3
5		12	−48.5.	− 350	3	67		15	+ 9.0.	−1405	3	129		16	+34.4	+1100	3
6		13	−48.2.	− 690	3	68	ω	12	+ 9.4.	+2300	3	130		14	+34.9.	− 580	3
7	η	12	−48.00	+ 302	2	69		14	+ 9.4.	−1560	3	131	e	11	+35.35	+ 984	1
8		12	−45.8.	−1527	3	70		15	+ 9.7.	−2430	3	132	I	9.10	+35.44	+ 54	1
9		12	−45.3.	+ 597	3	71		15	+10.7.	+1640	3	133		15	+35.6.	−2590	3
10		15	−38.0.	−1480	3	72		13	+11.5.	+ 290	3	134		14	+36.0.	− 620	3
11	ι	12	−36.83	+ 961	2	73	k	13	+11.7.	− 40	3	135		16	+36.1.	− 590	3
12		12	−34.4.	−2025	3	74	f	13	+12.7.	−2810	3	136		13	+36.9.	−3050	3
13		16	−32.5.	− 270	3	75		14	+13.6.	+ 190	3	137	N	11	+37.72	− 607	2
14		17	−30.0.	+ 820	3	76	z	13	+15.23	− 380	2	138	g	12	+37.8	−1920	3
15	θ	12	−29.83	+1082	3	77	α	12	+15.6	− 525	3	139		..	+39.1	+ 285	3
16	ζ	11	−29.63	+ 68	1	78		12	+15.9.	−1890	3	140	K	10.11	+40.07	+ 427	1
17	κ	12	−29.14	+1519	1	79		12	+15.9.	−2325	3	141		..	+40.2.	+ 340	3
18		16	−29.0.	− 490	3	80		13	+16.3	−2380	3	142		14	+40.6	− 30	3
19	π	11	−28.78	−1845	1	81	β	11	+16.5	−1465	3	143	s	8	+41.0	−3050	3
20		12	−28.2.	−1137	3	82		14	+16.7	− 300	3	144	L	11	+41.96	+ 135	1
21		12	−26.3	−2000	3	83		14	+17.6	+ 525	3	145	W	11	+42.0.	− 661	2
22.		12	−26.2.	− 150	3	84		13	+17.6	− 380	3	146		14	+42.1.	−3110	3
23		17	−26.1.	− 620	3	85		14	+17.7	−2465	3	147		14	+42.2.	− 555	3
24		14	−26.0.	+ 230	3	86		13	+18.2	− 220	3	148		15	+42.4.	−2105	3
25		16	−25.7.	+ 790	3	87		16	+18.4	− 980	3	149	F	9	+43.02	+1341	1
26		12	−25.6.	−2150	3	88		14	+18.7	+ 740	3	150	H	9	+43.85	− 407	1
27	m	12	−24.08	+ 326	1	89	Q	11	+18.80	+ 34	1	151		15	+44.7.	− 780	3
28		14	−24.0.	−2030	3	90		13	+19.5.	+1290	3	152		13	+45.3.	− 90	3
29	λ	13	−23.2.	+1310	3	91	J	12	+19.75	+ 979	2	153		12	+46.2.	+ 390	3
30		14	−23.1.	0	3	92	P	11	+20.24	+ 49	1	154	T	11	+46.31	+ 684	1
31	ε	12	−23.0.	+2130	2	93		16	+22.0	− 890	3	155		12	+46.5.	− 520	3
32		15	−22.1.	+2900	3	94		12	+22.0	−2108	3	156	S	12	+47.27	+ 328	1
33		15	−21.5.	+2915	3	95		12	+22.1	−1220	3	157	G′	10	+49.0	− 150	3
34	l	12	−20.42	+ 851	1	96	O	11	+22.29	+ 467	1	158	G	10	+49.16	− 123	1
35		13	−13.4.	+2650	3	97	γ	10	+22.53	−1753	1	159		15	+49.4.	− 765	3
36	n	11	−11.95	+ 272	1	98	ξ	13	+23.05	+1757	1	160		15	+50.8.	+ 580	3
37		15	− 9.1.	+2640	3	99	γ′	12	+23.2	−1803	3	161	v	11	+51.12	− 707	1
38	p	12	− 8.76	+1972	1	100		13	+23.6	−1660	3	162	μ	11	+51.8.	−2040	3
39		16	− 8.1	− 810	3	101		14	+23.6	−1245	3	163		13	+52.3.	+1390	3
40	r	12	− 7.39	+ 107	1	102	t	8	+23.61	−2646	1	164		15	+54.7.	+1200	3
41	x	12	− 6.2.	+ 15	3	103		16	+23.8	+1980	3	165	V	11	+54.78	+1723	1
42		13	− 5.7.	+ 300	3	104		14	+24.2	+2210	3	166		12	+56.2	−1590	3
43	y	11	− 5.07	−1178	1	105	q	12	+25.2	−1030	3	167		12	+56.5.	− 830	3
44		15	− 5.0.	+2560	3	106		15	+25.8.	−2160	3	168	ρ	12	+57.6.	+1010	3
45		15	− 1.6.	+2695	3	107	σ	13	+26.05	+2098	2	169	φ	11	+61.0	− 891	2
46		14	− 1.2.	+2520	3	108		16	+26.2.	+1900	3	170		15	+61.4	+1215	3
47		16	− 1.1.	+2750	3	109		14	+27.5	+ 835	3	171		12	+61.8	+ 670	3
48		13	− 0.9.	− 130	3	110		13	+28.0.	−1765	3	172	w	12	+61.9	− 459	1
49		13	− 0.9.	− 90	3	111	M	11	+28.87	− 53	1	173		15	+62.4	+1217	3
50	A	6	0	0	1	112	δ	12	+29.0.	−1921	2	174	w′	13	+62.5	− 439	3
51		14	+ 0.1.	+2525	3	113		16	+29.4.	+1715	3	175		14	+63.3.	+ 715	3
52		16	+ 1.1.	−1050	3	114	E	10	+29.55	+1183	1	176		14	+65.3.	− 125	3
53		16	+ 1.4.	+1360	3	115		12	+29.6	+ 450	3	177	U	11	+66.13	+1485	1
54		15	+ 1.5.	+1100	3	116	b	11	+29.9.	+ 157	2	178		12	+69.4	− 730	3
55		13	+ 2.0.	+ 345	3	117		15	+30.0.	−1600	3	179		13	+70.8	+ 870	3
56		15	+ 2.1.	+ 590	3	118	a	11	+31.44	− 15	1	180	ψ	11	+71.05	−1082	2
57		14	+ 3.1.	+1280	3	119	d	11	+31.64	− 135	2	181		15	+71.3	+ 160	3
58	B	7	+ 4.78	− 722	1	120	ν	12	+31.66	+1557	1	182		14	+72.3	+ 505	3
59		13	+ 5.0.	+1010	3	121		16	+31.8.	−1335	3	183		14	+77.1	+ 760	3
60	χ	12	+ 6.0.	+ 460	3	122		12	+32.1.	−1690	3	184		11	+77.2	−1315	3
61		15	+ 6.0.	−1050	3	123		12	+32.3.	+ 280	3	185	D	6	+77.75	+ 638	1
62		13	+ 6.4.	+1895	3	124		15	+32.4.	−1400	3	186		13	+81.0	+ 265	3

Fig. 2, Pl. I. h. 3435 = κ Crucis. R A, $12^h\ 43^m\ 36^s$, N P D 149° 25′ 31″ = Lac. 1110 (Neb.) = Δ 301 = B 4225.

(26) Though set down by Lacaille as nebulous, and on that authority entered as a nebula in Bode's Catalogue, no nebula is perceptible in any part of the extent of this cluster, which though neither a large nor a rich one, is yet an extremely brilliant and beautiful object when viewed through an instrument of sufficient aperture to show distinctly the very different colours of its constituent stars, which give it the effect of a superb piece of fancy jewellery. The area occupied by it is about one-forty-eighth part of a square degree, within which area I have laid down, partly from micrometric measurements (as regards the large stars) and partly from intertriangulation by the eye (as respects the small ones), the stars (110 in number) of the following catalogue.

CATALOGUE OF THE STARS LAID DOWN IN THE CLUSTER h. 3435 ABOUT κ CRUCIS.

No.	Letter.	Mag.	x ΔRA from α in time. Sec. Dec.	y ΔNPD from α in Mic. Pts. Parts.	Class.	No.	Letter.	Mag.	x ΔRA from α in time. Sec. Dec.	y ΔNPD from α in Mic. Pts. Parts.	Class.	No.	Letter.	Mag.	x ΔRA from α in time. Sec. Dec.	y ΔNPD from α in Mic. Pts. Parts.	Class.
1	π	10	−27.5	− 695:	2:	38		11	+ 7.6	− 421	3	75	v^2	11	+24.4	− 653	2
2		12	−19.1	− 840	3	39		14	+ 8.6	− 643	3	76	ι	10	+24.7	+ 282	1
3		14	−14.2	− 595	3	40		14	+ 9.2	− 646	3	77	ζ	9	+24.8	− 56	1
4		12	−14.1	− 468	3	41		13	+ 9.6	− 734	3	78		12	+25.1	− 558	3
5		15	−13.2	− 351	3	42		14	+10.6	− 735	3	79		14	+25.7	− 800	3
6		15	−12.3	−1002	3	43		11	+11.0	−1211	3	80	β	7	+26.3	− 718	1
7		12	−12.1	− 695	3	44		14	+11.2	−1168	3	81		14	+26.5	− 283	3
8		13	− 8.6	−1130	3	45		16	+12.2	− 327	3	82	θ	10	+26.7	− 874	2
9		15	− 8.5	− 958	3	46	ω	11	+12.3	− 334	2	83		14	+26.8	− 797	3
10		14	− 6.3	− 730	3	47		14	+12.5	− 384	3	84		13	+27.0	−1060	3
11	κ	10	− 6.0	−1468	2:	48	ξ	11	+13.2	−1014	1	85		13	+27.6	− 357	3
12		13	− 4.7	−1100	3	49		15	+13.4	− 463	3	86		16	+27.8	+ 104	3
13		15	− 4.0	− 265	3	50		15	+13.9	− 493	3	87		14	+27.8	−1073	3
14		14	− 4.0	− 910	3	51		14	+14.2	− 237	3	88		13	+27.9	+ 78	3
15		15	− 3.2	− 260	3	52	δ	8	+15.2	− 430	1	89		15	+28.0	− 431	3
16		13	− 2.3	− 620	3	53		13	+15.4	− 85	3	90		12	+28.6	− 949	3
17	μ	11	− 1.5	− 879	1	54		14	+15.9	− 764	3	91		14	+28.6	− 416	3
18		13	− 1.1	− 490	3	55		14	+16.0	− 490	3	92		12	+29.0	− 575	3
19		15	− 0.2	−1043	3	56	ϕ	10	+16.3	− 374	1	93		11	+29.4	− 656	3
20	α	7	0	0	1	57		13	+16.3	+ 5	3	94		11	+29.6	− 452	3
21		13	+ 0.4	+ 211	3	58		12	+16.7	− 717	3	95		11	+30.2	− 726	3
22		15	+ 0.6	− 854	3	59	o	11	+16.7	−1003	2	96		14	+30.4	− 926	3
23		13	+ 0.8	−1010	3	60		14	+17.8	− 942	3	97		13	+32.9	− 484	3
24		12	+ 2.6	+ 105	3	61		13	+17.9	− 724	3	98		13	+33.7	− 426	3
25		11	+ 2.7	− 448	3	62		15	+18.0	− 458	3	99		15	+34.5	− 726	3
26		11	+ 2.8	− 662	3	63	ε	9	+18.9	− 313	1	100	ρ	10	+34.7	−1313	1
27	ν	11	+ 3.0	− 813	1	64	a	13	+19.0	− 390	3	101	χ	12	+35.9	− 925	2
28		14	+ 3.1	−1300	3	65		13	+19.5	− 740	3	102	γ	7.8	+36.9	− 106	1
29		13	+ 3.3	− 208	3	66		13	+20.5	− 284	3	103		16	+37.3	− 720	3
30		15	+ 3.6	− 610	3	67		15	+21.2	−1037	3	104		16	+38.7	−1143	3
31		12	+ 3.7	+ 140	3	68		14	+21.4	−1093	3	105		15	+40.1	−1121	3
32		11	+ 3.8	− 566	3	69		13	+21.4	− 325	3	106		15	+42.0	−1165	3
33		12	+ 3.9	− 276	3	70		11	+21.7	− 675	3	107	σ	12	+43.8	− 903	2
34		14	+ 4.0	− 790	3	71		15	+22.7	− 366	3	108		12	+46.0	− 583	3
35		15	+ 4.4	−1200	3	72	η	9	+23.8	−1121	1	109		14	+47.3	− 648	3
36		14	+ 4.7	− 712	3	73	v^1	11	+24.0	− 644	2	110	τ	11	+51.5	− 585	2
37		14	+ 4.8	− 366	3	74		12	+24.4	− 22	3						

F

(27) Colour is conspicuous in the following stars of the above catalogue:—

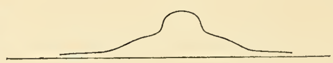
α Greenish-white.	δ Green.	ϕ Blue-green.
β Greenish-white.	ϵ Red.	a Ruddy.
γ Greenish-white.	ζ Green.	

The stars of Class 1, have been determined by equatorial differences of R A and N P D. Those of Class 2, by angular measures or good allineations combined with an observed difference of R A and those of Class 3, on a simple reading off of the places as inserted by the eye within the triangle of a prepared skeleton. The Δ N P D of the star Π. (No. 1) may be 8 or 10″ in error, owing to a probable mistake in reading, in one of the equatorial measures of position.

Plate III. figs. 1, 2, 3, 4, 5, 6.

(28) The six figures on this plate are all delineated on a uniform scale, the area included in each being 9′ 30″ in the vertical direction or that of the meridian, and 11′ in that of the parallel, or about one-fiftieth of a square degree. The first of them (fig. 1,) represents Lacaille's nebula 47 Toucani of Bode's Catalogue, or No. 2322 in mine, resolved into stars as described in the observations above recorded, and as seen on a great many other occasions. The contrast between the rose-coloured light of the interior and the white of the exterior portions cannot, of course, be represented in an engraving, but of the phenomenon itself, I have no doubt. The double star on the south preceding edge of the more condensed portion has probably no connexion with the cluster.

(29) The law of condensation of this cluster is remarkable. Three distinct stages or steps of degradation are noticeable; the density at any point of the diameter being proportional to the ordinate of a curve whose form is that of the annexed figure, in which the diameter of the central elevated portion corresponds to $13^s.5$ of right ascension. Its figure is round, and not elliptic,—(at least not *so* elliptic) as described and figured by Mr. Dunlop. I will not take upon myself to say that the extreme outlying stars which extend to 10′ or 12′ on all sides from the centre may not show some tendency to elongation in one direction rather than another; but as regards all its interior portion, on the very frequent occasions on which I have viewed it myself and shown it to others, I have always considered its appropriate designation to be *a globular cluster*, nor has any remark to the contrary made by those who have examined it in my presence led me to regard this character as doubtful. I am more particular than I otherwise should be in noticing this discrepancy, because all my experience has led me to conclude that the globular form is much more generally accompanied with perfect resolution into stars than the elliptical. Indeed I can hardly call to mind an instance of an elliptical nebula of any considerable size and brightness*



* The oval nebula M. 1 = h. 357, near ζ Tauri, is barely resolvable in the twenty feet reflector; and if I am correctly informed, the three feet speculum of Lord Rosse suffices for its complete resolution. The great nebula of Andromeda, however, as also the first of my Father's 5th class (h. 61), discovered by Miss

which the power of the 20 feet reflector suffices so to resolve; while examples on the other side, of *globular* clusters perfectly resolved, without any remaining suspicion of unresolved nebulosity are innumerable. Between these two characters then, (ellipticity of form and difficulty of resolution) there undoubtedly exists some physical connexion. Possibly the conditions of dynamical equilibrium in a sphere may be compatible with larger intervals and greater separate magnitudes than in an ellipsoid—a subject on which more hereafter. It deserves also to be noticed that in very elliptic nebulæ which have a spherical centre, (as in M. 65 = h. 854) a "resolvable" or mottled character often distinguishes the central portion, while the branches exhibit nothing of the kind.

(30) The remaining five figures of this plate represent fields of view (or at least so much of the circular field of 15′ in diameter as can be included in the rectangular area of each figure) in the Nubecula Major. They are for the most part eye-drafts assisted as to the proportions of the parts in copying for the engraver by a few measured angles. The original drafts were made with much care, not in the course of sweeping, but in observations devoted especially to that purpose, on the full scale, or very nearly so, on which they are engraved, in order to illustrate the strange and anomalous variety of structure which subsists in that system. In addition to the descriptions appended in the catalogue to the observed places of the several nebulæ of which these respective groups consist, there are some other particulars which require notice, as follow.

(31) Fig. 4, Plate III.—The single observation of ƒ 523, No. 50, would appear to have been somewhat hurried owing to the quick succession of objects, and the stars referred to as mixed with the group may be either the two stellar nuclei of the brighter nebulæ in the upper group taken for stars, or may refer to the stars intermingled with those in the lower and the intermediate ones. The nebulous mass which this figure is principally intended to represent, consists of at least 8 nebular nuclei, four of which are much more conspicuous than the others, and in hazy weather, or with an inferior telescopic power, appear as four distinct nebulæ forming a trapezium, for which reason their places as derived from the drawing by measurement on a scale have been inserted in this catalogue.

(32) Fig. 5, Plate III.—The two brighter portions of the principal nebula (the "triple nebula" of the descriptions) have somewhat of a mottled or resolvable character which is not alluded to in the sweeps—probably for want of time for the eye to grow accustomed to the object.

(33) Fig. 6, Plate III.—The "Binuclear nebula," as it is called in the descriptions, "at the southern end of an arc-formed cluster," consists in reality of four nuclei, (one of them very faint) feebly united by very faint nebula. The fourth is, however, almost detached. The long attention bestowed on this nebula has also led to the detection of another very faint nebula, (that which follows the double star in the lower part of the figure) h. 2810 which had been overlooked in all the sweeps, and is entered in the catalogue on the evidence of this figure.

(34) Besides these more elaborately delineated groups, three other groups in the

C. Herschel, by far the most conspicuous among elliptic nebulæ, have hitherto, so far as I am aware, resisted every power which has been applied to them.

Nubecula Major, are also represented in Plate IV. Figs. 7, 9, and Plate VI. Fig. 20, from diagrams made in the course of sweeping and without the same pretensions to exactness which the foregoing possess, though tending to give a very good idea of the objects they represent, as well as further to elucidate the peculiar character of the Nubecula.

(35) Plate IV. Fig. 1, h. 2552.—This curious object belongs to the class of *Annular nebulæ with centres*, a class consisting so far as we at present know of only three individuals, viz. this and the two extraordinary objects M. 51, and M. 64, represented in figures 25 and 27, of my Northern Catalogue, between which the nebula now under consideration holds a kind of middle place. Although the nebulous ellipse into which the annulus is obliquely projected is incomplete at the extremities of its longer axis, yet its general form cannot be mistaken. The central mass is much more concentrated than that of M. 51, and resembles more nearly that of M. 64, which latter, it is further to be remarked, has for its nucleus either a double star or some resolvable group putting on that appearance, while our present object is expressly stated to have a resolvable nucleus.

(36) Plate IV. Fig. 2, h. 3501 is a very problematic object, and must be regarded at present as forming a genus apart, since it evidently differs from mere "double nebulæ," not only in the singular relation of its two halves to each other, (having each a well and an ill-defined side, their sharply terminated edges being turned towards each other and exactly parallel) but also by the intervention of the delicate nebulous streak intermediate between them and lying in exactly the same general direction. It may perhaps be considered that the nebulæ V. 24 and I. 43, (figs. 37 and 50, of my Northern Catalogue) offer some analogy of structure to this; but if so it is a very remote one, the nebulæ constituting these objects being in both instances very unequal in size and brightness, and being individually merely elongated nebulæ of the ordinary type, which these are not. On the other hand we have, in the completely resolved cluster, Plate V. Fig. 5, an object which, removed to such a distance as to appear nebulous, would present a considerable approach to it in point of general aspect.

(37) Plate IV. Figs. 3 and 6, h. 3239 and 2370, are objects evidently analogous, and may be termed "falcated nebulæ," the falcated form, however, being much less marked in the latter than the former, the train forming a less conspicuous appendage. Each has a double star (or a resolvable nucleus putting on that appearance) in its head or more condensed part. It should be observed that the stars in fig. 3, are put in without any attempt at individual delineation. This fine nebula occurs in a very rich part of the milky way, in that wonderfully superb region which ushers in the great nebula about η Argus.

(38) Plate IV. Fig. 4; h. 3075 is an object altogether unique. The resemblance to a "bust or silhouette profile," though really obvious, is perhaps somewhat exaggerated (as all such fancied resemblances are sure to be) though involuntarily, in the drawing. It is described by my Father, as "a broad extended nebulosity forming a parallelogram with a ray southwards." He does not make any mention of the stars in it (see his Catalogue, V. 21.).

(39) Plate IV. Fig. 5, h. 3523.—This is Bode's 185 Centauri, observed by Lacaille, and remarked by him as nebulous. The reader will not fail to compare it with V. 43,

figured in my Northern Catalogue (fig. 55), to which it bears a perfect analogy. They are the two finest specimens of their class—that of *large, faint, oval nebulæ with small, bright, exceedingly condensed, oval nuclei.* And it will not escape notice, on comparison of the figures, that in both cases the nucleus appears to contain within it a still smaller round kernel. The minute scrutiny of these objects with instruments of larger aperture and high magnifying powers, would be in the highest degree interesting and instructive. The situation of 185 Centauri, is however too low for very satisfactory observation in these latitudes.

(40) Plate IV. fig. 7 = h. 2859, &c., fig. 8 = h. 2315, and Plate V. fig. 10 = h. 2359,—represent nebulæ of irregular forms having a tendency to several centres of condensation; in the case of fig. 7 but little conspicuous—in that of fig. 8 (otherwise remarkable for its extravagant length and crooked shape) much more so, while in Pl. V. fig. 10, the formation of separate nuclei is decided, the intermediate faint nebula barely sufficing to mark them as forming a connected system. We may conjecture, though to us and probably to a remote posterity, it can be no more than conjecture, that such groups as Pl. IV. fig. 9 = h. 2923, &c. fig. 10 = h. 3324, &c. and fig. 11 = h. 3908, &c., may, in the progress of indefinite ages, have resulted from a process of internal segregation from nebulæ which once occupied the whole of their intermediate space, but which has at length been completely absorbed from among them, and it is only by placing on record, as early and as precisely as possible, such instances as the above, that any chance, however slender, of exchanging conjecture for knowledge can be looked for. The group IV. fig. 10, is certainly a very remarkable and interesting one by reason of the variety of nebulous forms it exhibits in so small a compass; and as it occurs in a region which, though rich in clusters of distinct stars, is nearly devoid of nebulæ of any of these particular forms, the probability of their systematic connexion amounts almost to certainty.

(41) Where the milky way crosses the 18th hour of right ascension, and over a great many degrees of its extent in polar distance in the region occupied by the tail of Scorpio the continuity of it is singularly broken, and many parts of its borders are so sharply defined as to present a pretty distinct outline so as to divide the field of view into a part with and another without milky way. In these spots the component stars are usually very small, so as in some cases to put on the appearance of a barely *resolvable* nebula. In figures 1, 2, 3, Plate V. characteristic specimens of these appearances are represented from rough diagrams made at the time of their occurrence.

(42) Plate V. fig. 4, 5, 6 = h. 3641, 3707, 3644, are clusters of stars in which only general character is attempted to be expressed from the sweeping diagrams. They are of no peculiar interest otherwise than as they may elucidate (as in the case of fig. 5) certain aspects of nebulæ which may by possibility be supposed to originate in such clusters more abundant in stars and removed to such a distance as to appear nebulous.

(43) Plate V. fig. 7 = h. 3504 is the noble globular cluster ω Centauri, beyond all comparison the richest and largest object of the kind in the heavens. The stars are literally innumerable, and as their total light when received by the naked eye affects it hardly more than a star of the 5th or 5-4th magnitude, the minuteness of each may be imagined: it must however be recollected that as the total area over which the stars are diffused is very considerable (not less than a quarter of a square degree), the resultant impression on the sensorium is doubtless thereby much enfeebled, and that the same quantity of light concentred on a single point of the retina would very probably exceed in effect a star of the 3rd magnitude.

On a consideration of all the sweeping descriptions, as well as from a great many occasional inspections of this superb object, I incline to attribute the appearance of two sizes of stars of which mention is made to little groups and knots of stars of the smaller size lying so nearly in the same visual line as to run together by the aberrations of the eye and telescope; and not to a real inequality.* This explanation of an appearance often noticed in the descriptions of such clusters, is corroborated in this instance by the distribution of these apparently larger stars in rings or mesh-like patterns, chiefly about the centre where the stars are most crowded. An attempt has been made to imitate this appearance in the drawing, but partly from the difficulty of its execution, partly from defect of engraving, the plate fails to convey a just idea of it. Two such rings on an oval crossed by a kind of bridge is especially conspicuous in the central part.

(44) Plate V. fig. 9 = h. 3221, fig. 11 = h. 2621. Pl. VI. fig. 19 = h. 2327.—These figures exhibit elliptic nebulæ normal in their character — that is to say, in which, as the condensation increases towards the middle, the ellipticity of the strata diminishes, or in which the interior and denser portions are obviously more nearly spherical than the exterior and rarer. A great number of such nebulæ, of every variety of ellipticity and central condensation are figured in my Northern Catalogue. Regarding the spherical as only a particular case of the elliptic form, and a stellar nucleus as only the extreme stage of condensation, at least nine-tenths of the whole nebulous contents of the heavens will be found to belong to this class—so that, as regards a law and a structure, the induction which refers them as a class to the operation of similar causes, and assumes the prevalence within them of similar dynamical conditions, is most full and satisfactory. To abstain altogether from speculation as to what may be the nature of those causes and conditions, and to refuse all attempts to reconcile the phenomena of so large and so definite a class of cosmical existences with mechanical laws taken in their most general acceptation, would be to err on the side of excessive caution, and unphilosophical timidity. The time is clearly arrived for attempting to form some conception at least of the *possibility* of such a system being either held in a state of permanent equilibrium, or of progressing through a series of regular and normal changes, resulting either in periodical restorations of a former state, or in some final consummation.

(45) The remarkable object h. 3145, represented in Plate V. fig. 12, is by no means referable to this normal class. It is expressly described as brightest, not in the middle of its length, but at one end. Neither is its figure elliptical, but broader at the faint than at the bright extremity, the bounding lines being nearly rectilinear. It is a very faint and delicate object, and I regret not having obtained more than one observation of it.

(46) Plate V. fig. 8 = h. 3154, and VI. 5, 6, 7, 8, 9 = h. 3248, 3675, 3610, 3594, 3228, represent *planetary nebulæ*, a class of especial interest, and of which, considering their general rarity, the southern heavens have afforded a rather unexpectedly large harvest. Those only are here delineated which have either accompanying stars, or which are distinguished by some peculiarity, as Pl. VI. fig. 5 = h. 3248, which has a slight *chevelure* or nebulous haze exterior to its large oval disc; VI. fig. 9 = h. 3228, which has a star or a small disc near its

* The perfect roundness of the disc of γ *Virginis* under a magnifying power too low for its resolution, noticed both by Captain Smyth and myself (see the details further on), affords an excellent illustration of this explanation.

centre; or V. fig. 8 = h. 3154, situated in the midst of a cluster of stars, with which it contrasts singularly, and with which, if it have no connexion, it is strange that the very same combination should be *fortuitously* repeated in the case of M. 46+H. IV. 39 (not here figured), and a near approach to it in h. 3100, h. 3101, observed in sweep 771, as in the field with a cluster of the 7th class.

(47) A most remarkable peculiarity of the planetary nebula, Pl. VI. fig. 5 = h. 3248, but which cannot be represented in an engraving, is its very decided though pale blue colour, which is noticed in three out of the four observations recorded in the sweeps. This and the beautiful planetary nebula h. 3365, in which the blue colour is much more striking and intense, are the only objects of that colour in the heavens so situated as to admit of no suspicion of contrast with a red star influencing the eye. It is true that in the latter instance a considerably bright red star is near, and *may* be brought into the same field of view,—and that its presence greatly enhances the tint of the nebula. But the star is remote enough to be easily excluded, and the nebula does not cease thereby to appear of a fine blue colour.

(48) Plate VI. fig. 10 = h. 3548, and fig. 11 = h. 2775, are nebulæ, *centrally* involving double stars. Central superposition must undoubtedly be held strong presumptive evidence of physical connexion. The nucleus of M. 64 is strongly suspected to be a close double star. In fig. 30 of my Northern Catalogue is represented a very remarkable example, h. 2002, of this combination of a double star with an oval nebula—the direction of the two stars of the double star being also that of elongation of the nebula. Struve in his Dorpat Catalogue, No. 2332, has adduced a similar example. The nebula h. 2858, R A, $5^h\ 26^m$, N P D 156° 44′ is again another case in point, as would also h. 3122, R A, $8^h\ 14^m$ N P D 125° 41′, were it quite certain that one of the stars is anything more than the nucleus of an ordinary nebula which has upon it an accidental star. No such supposition applies to h. 3548, in which both the stars are sharply defined, and of the 10th magnitude, and have been repeatedly made the subjects of micrometrical measurement.

(49) Plate VI. fig. 12 = h. 3131, must be considered as adding another to the list (a very sparing one) of "nebulous stars," as, although the coma is not perfectly round, the situation of the star is precisely at the general centre or point of greatest concentration. There can hardly be a doubt, we may presume, that objects of this class are in no way to be regarded as of an exceptional or abnormal character—but simply as cases where the general law of central condensation is pushed to its extreme, *i. e.* up to a nuclear disc of imperceptible dimensions—in other words, a star.

(50) Plate VI. fig. 13 = h. 3661, fig. 14 = h. 2487, fig. 15 = h. 3541, and V. 11 = h. 2621. —The frequent association of nebulæ in pairs forming "double nebulæ," has been dwelt on in the remarks on figures 68 . . . . 79, appended to my Northern Catalogue, and need not here be again insisted on. Among the specimens here figured, M. 62 (h. 3661) is interesting both from its being evidently *a double globular cluster*, and by reason of the comparative feebleness of the condensation about the southern centre and the small interval (compared with the total diameter of the object) which separates them.—h. 3541 is only remarkable as being the smallest object of this kind which has yet been observed, and this figure as well as the next (fig. 16) are rather intended as guides to the eye of any future observer who may direct a telescope on this and the very minute single nebula h. 3727,

than to express any peculiarities in the objects.—h. 2621 may be compared with h. 1397 which is represented in fig. 76, of my Northern Catalogue, and which it very strongly resembles. These combinations will not fail to suggest the conception of a globular cluster revolving round a very oblate spheroidal one in the plane of its equator, and in an orbit which, if circular, and seen obliquely, like the central nebula itself, would have a diameter somewhat more than four times that of the latter—a stupendous system doubtless, but of which the reality can hardly be considered improbable.

(51) Plate VI. figs. 17, 18 = h. 2535, R A $3^h\ 16^m\ 58^s$ and h. 3688, R A $17^h\ 22^m\ 43^s$ represent "cometic nebulæ" attached to stars. Four such objects are represented in figs. 64, 65, 66, 67 of my Northern Catalogue.

(52) Plate VI. fig. 1 = h. 3514, and fig. 2 = h. 3241.—The first figure in this plate represents an object of a very singular nature—it is an oval nebula pretty well defined, though faint, and deviating widely from the normal characters of such nebulæ, so as to approach in some degree to the structure of M. 27, as figured in fig. 26 of my Northern Catalogue. It is true that the disposition of the bright axis is not nearly so symmetrical, nor are its two terminal masses so conspicuous in proportion to the whole size of the object —nor indeed is the axis straight. A general similitude however exists sufficient to warrant their being provisionally classed together, and our class so extended may also take in the small but interesting nebula fig. 2 = h. 3241, where however the axis is wanting to connect the terminal masses, so that possibly this object may be nothing else than a very close double nebula, whose individuals are small and much compressed. For another analogous structure *confer* Dr. Lamont's thesis of August 25, 1837. Fig. IV.

(53) Plate VI. figs. 3, 4 = h. 3680 and 3686.—These are Annular Nebulæ, of which (not to speak at present of the very large faint object V. 19) we have already two examples in the northern hemisphere, M. 57 (the annular nebula between β and γ Lyræ) and IV. 13—represented in figures 29 and 48 of my Northern Catalogue. It is not impossible that the real constitution of these bodies may be that of hollow spherical or elliptical shells, of which the borders appear brighter than the interior, by reason of the greater thickness of the luminous matter, or starry stratum, traversed by the visual ray. Certain it is that the interior of M. 57 is very far from totally dark, and that so much light exists within the annuli of IV. 11 and IV. 13, that they are set down by my Father as planetary nebulæ, and the latter is even described by him as "of equal light." The delicate and beautiful annulus h. 3680, appears indeed to be devoid of any interior illumination—but the object is so faint that a nebulosity filling in the centre, and bearing no greater proportion in respect of density to the ring than in the case of M. 57, could not have been perceived. The tenuity of the ring, as well as the feebleness of central illumination, will of course in our hypothesis be proportioned to the thinness of the shell, and the law of degradation of its light will be determined by the ratio of the radii of its inner and outer surfaces, as well as by the law of density of the strata of which it consists. IV. 11 and IV. 13, would therefore seem to have the central hollow smaller in proportion than either of the other two.—V. 19 is probably not a hollow shell, but a real annulus, whose actual dimensions must be indeed enormous, being described by my Father as more than a quarter of a degree in length, which, supposing it *only* as remote as 61 Cygni, would correspond to a real diameter 1300 times exceeding that of the earth's orbit.

Of the Great Nebula in the Sword-handle of Orion.

(54) It may easily be supposed that in a situation so favourable for viewing this magnificent object as the Cape, where it passes the meridian at an altitude of 60°, with the additional advantages of a sky of perfect purity, and of mirrors in a constant course of repolishing, I should eagerly seize the opportunity to re-examine my earlier delineation of it, with a view to the detection of change, the correction of error, and the observation of further particulars as to its form, extent, and structure which had escaped previous observation. Although considerable pains had been taken with my figure of 1825 (engraved in the 2nd vol. of the Memoirs of the Astronomical Society) to express the gradations of light and the general form of the nebula and its principal branches, and although in both these respects that figure, taken altogether, may, I believe, fairly claim to be considered more correct than any other of the same object which has yet appeared,* as well as more exact in many of its details; yet the first glance obtained of it under these more favourable circumstances sufficed to convince me of the necessity of executing a redelineation of it, based upon a micrometric survey and projection of the stars contained within its area, and comprehending a multitude of nebulous branches, convolutions and other details, of whose existence I had never before had the least suspicion. The figure of 1825 was executed without the aid of micrometric measurements, or

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* I am aware but of four representations of this nebula which have appeared since 1824,—one by Dr. Lamont, published with his thesis "Ueber die Nebelflecken," read at the anniversary sitting of the Bavarian Academy of Sciences, August 25, 1837; and two by Sig. Rondoni, a Roman artist. The former, though rather a coarsely executed figure, and confined solely to the denser part of the nebula, or those regions which I have termed the *Front, Occiput,* and *Fauces,* yet contains some valuable particulars respecting the apparent breaking-up of the nebula (especially about the front and occiput) into patches and knots; particulars very unsatisfactorily expressed in my figure of 1824, but in which my observations of 1834 and 1837 fully confirm Dr. Lamont's remarks. In his figure he has (perhaps intentionally) omitted to express the remarkable effusion of the nebula from the "Front" and "Proboscis" into what I have termed the "Subnebulous Region," and he has filled the interior of the trapezium with nebula, a particular in which we disagree decidedly. The two figures of Sig. Rondoni, which are given in the Report of Observations made at the Collegio Romano, by the associated astronomers of the Gregorian University, for the years 1840 and 1841, are perhaps rather to be regarded as curious specimens of lithography than as accurate representations of the nebula (such, at least, as I have ever seen it), which they resemble in fact hardly more than they do one another. Nor should I have thought it necessary to do more than simply mention them, were it not that one of them has been referred to by Mr. Hunt, in his recent work entitled "Researches on Light," as an instance of *direct* photographic representation impressed on a lithographic stone *by the light of the nebula itself.* Were this the case, the high authority which a self-impressed picture would claim must necessarily lead to the absolute rejection both of Dr. Lamont's and my own figures, or else to the conclusion of changes both in the nebula itself, and in the situations, relative brightnesses, and nebulous appendages of the stars adjacent to it, of a very extraordinary and capricious kind. In fact, however, the inscription on the margin of Sig. Rondoni's figure simply expresses (as I understand it) that his original drawing (probably an eye-draft) was subsequently transferred to a surface of stone by a photographic process. I purposely avoid all comment on the remarks which accompany these two representations, leaving astronomers to form their own judgment on them. The other representation above alluded to is that of Sig. Devico himself, in the year 1839, printed in the Annals of the Collegio Romano for 1838, which, though much less inaccurate in many respects than Sig. Rondoni's, is by no means free from objection on that score.

at best of very rude and imperfect ones, which, in an object of such extent, must of course afford much room for distortion and want of due proportion in the magnitudes of particular parts. Nor had I at that time the same command of polish and figure in the specula which subsequent practice has conferred, so that imperfections in both were tolerated, from a degree of timidity in applying the remedy, which were not considered endurable at a more advanced period.

(55) Accordingly a series of equatorial observations of differences of R A and N P D was set on foot with a view to furnishing the requisite data for the construction of working skeletons to be divided into triangles and so filled in with the nebulous details, and telescopic stars, to be ultimately transferred to a general drawing, and catalogued in order of right ascension, according to a regular and systematic mode of proceeding. These differences were obtained chiefly on the nights of December 18, 19, 1834; December 17, 19, 22, 1836; and February 18, October 21, 23, November 5, 14, 15, 16, 24, 1837. One set of observations of this nature had previously been procured in England in 1831, and 1832, and a few differences of right ascension as early as 1825, with the 20 feet reflector. From the assemblage of these differential measures consisting altogether of upwards of 300 differences of R A, and nearly as many (270) of Polar distance, the details of which it is unnecessary to give, the relative situations of those stars which are marked in the annexed Catalogue as of the first class were concluded, with as much precision as can be considered requisite for such a purpose.

(56) By the aid of the measures of December, 1834, and the English series alluded to, the first skeleton was laid down and filled in on the 4th and 29th January, 1835, and on the 27th December, 1836, and a number of curious and interesting particulars noticed and delineated, of which more in their proper place, but it was not till the end of 1837 that the accumulation of the micrometric measures had enabled me to lay down with some precision a set of skeletons, four in number, extending over the whole nebulous area intended to be included in the drawing. These were completed and filled in on the 19th, 23rd, 24th, and 30th November, and on the 1st and 2nd of December, 1837, on the former of which nights also a set of micrometrical position-angles were procured for the purpose of ascertaining the situation of two small but important stars (marked L and l in the annexed Catalogue), critically situated on the Messierian Branch (as I have taken the liberty to call it) of the nebula, and which had escaped observation in the equatorial, owing to their minuteness.

(57) The triangles of all the skeletons were examined seriatim, and all the stars visible in them even to the smallest magnitudes scrupulously laid down, at least in those regions on which the principal interest excited by the object is naturally concentrated. It must however be observed that in the denser portions of the nebula, so bright is the diffused light, that it is extremely difficult to fix attention on such minute points, and that glimpses are often caught and lost again in a manner which renders it impossible to say positively that a *star* has or has not been seen. No star however has been laid down in my triangles and entered in the Catalogue, but such of whose existence I am certain, from repeated and distinct views; though I can hardly doubt that some of the glimpses above referred to have been caused by stars really existing. The suspected star marked x in my old figure, in the middle of the " nebula oblongata" as there laid down, certainly does *not* exist. The nebula was lastly carefully worked in on each triangle, bestowing especial regard on its configuration with respect to every star in its area.

(58) The mode of "reading off the skeletons" so as to obtain from them the most probable right ascensions and polar distances of the unknown stars laid down in them, requires some explanation. The places of the "skeleton stars" (those of the first class in the Catalogue) finally adopted not being precisely those used for laying down the skeletons, but having been subsequently deduced from the observations on a general and careful revision of their whole assemblage—there will necessarily be a discordance to the extent of a few micrometer parts in polar distance, and a few tenths of a second in right ascension between each skeleton and the adopted catalogue, even for those stars which form the angles of the triangles into which it is divided: neither will the amount of this discordance be the same in every part of the same skeleton. Any star then laid down within a triangle whose angles we shall denote by A, B, C, will have its place as referred to a system of *true* meridians and parallels supposed to be drawn across the skeleton, affected by an error (and requiring a contrary correction) determined by and calculable from the errors in R A and P D of A, B, and C, similarly referred to the same system of co-ordinates. Now the stars being laid down within each triangle by the sole judgment of the eye, it is not possible to eliminate the errors of such judgment by any system of calculation—but the errors produced by small displacements of the angles may be reasonably enough supposed to depend on the proximities* of those angles to the point laid down, so that calling the proximity of that point to A, B, and C, respecting a, b, and c the formula

$$\frac{\mathrm{A\,a} + \mathrm{B\,b} + \mathrm{C\,c}}{\mathrm{a} + \mathrm{b} + \mathrm{c}}$$

will express the error of its place either in R A or P D, if A, B, C, represent the errors in those of A, B, C, respectively in the same directions. The proximities in question are sufficiently well determined for the purpose without measurement (which would be intolerably laborious) by the mere judgment of the eye—and when the unknown star lies in or very near one side (as A B) of the triangle, the influence of the opposite angle (C) on the result must be proportionally diminished by assigning to it a less proximity.

(59) On this principle then each skeleton is separately read off. A system of meridians at 10^s of time apart in R A, and of parallels distant from each other by 1000 micrometer parts ($= 240''{\cdot}44 = 4'\ 0''{\cdot}44$) is carefully drawn, the zero line of each passing through the chief or fiducial star (θ^1 Orionis) and upon this system, by a diagonal scale, the right ascension and polar distances of every star, known and unknown, of the skeleton is read off. The places of the known stars thus read off compared with their catalogued places furnish the corrections required for each of them, and from these by the above formula those to be applied to the readings of the unknown stars are derived. The same process being repeated for all the skeletons, the readings are arranged in order of right ascension, and stars which occur in different skeletons being identified, and the means of their places taken, a catalogue results, as free from error as the nature of the observations will permit. The magnitudes assigned to each star at each observation are in like manner collected and a mean taken which is the magnitude finally adopted. The following is the result of this process for the nebula now under consideration.

* I use the term proximity in a strict sense, to express the reciprocal of the distance $\left(\frac{1}{\mathrm{D}}\right)$—a form of expression of much convenience in many applications of algebra to geometry and physics.

CATALOGUE OF STARS OBSERVED IN THE NEBULA ABOUT θ ORIONIS.

No.	Letter.	Mag.	x = ΔRA from α. Sec. Dec.	y = ΔNPD from α. Parts.	Class.	No.	Letter.	Mag.	x = ΔRA from α. Sec. Dec.	y = ΔNPD from α. Parts.	Class.	No.	Letter.	Mag.	x = ΔRA from α. Sec. Dec.	y = ΔNPD from α. Parts.	Class.
1	Z	8	−129.2	− 599	1	51		17	− 6.7	+ 45	3	101	ζ	7	+ 10.1	+ 395	1
2	(χ)	12	− 87.9	+2411		52		15	− 6.5	+1526	3	102	e	12	+ 10.4	−2009	
3	(μ)	8.9	− 81.3	+3291		53	σ	8	− 6.2	+1126	1	103	ψ	13	+ 10.7	+ 971	3
4	(ν)	9.10	− 80.6	+3918		54		15	− 6.0	+ 718	3	104	λ	9	+ 12.2	+ 728	1
5	Q	10	− 65.5	− 55	1	55		16	− 5.7	+2008	3	105		15	+ 12.4	+2882	3
6	(ζ)	10.11	− 62.1	−2811		56		16	− 5.6	−1658	3	106		12	+ 13.5	+2345	3
7	(ξ)	10	− 61.6	+3422		57		17	− 4.6	+ 8	3	107		14	+ 13.5	−3427	3
8		12	− 61.6	+1293	3	58		13	− 4.3	+3809	3	108	μ	6.7	+ 14.4	−1843	1
9		12	− 59.5	+3395	2	59		12	− 2.3	+4019	3	109		16	+ 14.4	−1123	3
10	π	11	− 57.2	+1018	1	60		15	− 2.3	+3200	3	110	η	8	+ 15.0	+ 453	1
11	(π)	10.11	− 55.5	+3929	1	61		15	− 2.2	+4889	3	111	E	10	+ 15.5	+2417	1
12	R	11	− 51.5	− 256	1	62		15	− 1.8	+1859	3	112		12	+ 16.9	+1891	3
13		14	− 50.5	+ 226	3	63		13	− 0.7	+3932	3	113	b	9.10	+ 18.3	−2760	
14		14	− 49.0	+ 239	3	64	γ'	13	− 0.7	− 52	1	114		16	+ 20.0	− 535	3
15		15	− 49.0	+1944	3	65	γ		− 0.7	− 36	1	115		16	+ 21.4	+3382	3
16		12	− 47.6	+2376	3	66		16	− 0.6	−2097	3	116		18	+ 23.6	−1601	3
17		14	− 47.2	+ 163	3	67	δ	8	− 0.4	− 67	1	117	p	16	+ 24.4	+ 985	2
18	t	10.11	− 46.4	+1050	1	68		15	− 0.1	+4844	3	118		16	+ 24.7	−2875	3
19		14	− 44.0	− 70	3	69	α	5	0	0	1	119			+ 24.7	−3518	3
20		8	− 43.6	+5740	4	70		12	+ 0.3	− 396	3	120	χ	11	+ 25.1	− 819	1
21		13	− 41.7	+1255	3	71	α'	14	+ 0.3	+ 5	2	121	q	17	+ 25.4	+1069	2
22		16	− 41.0	+2282	3	72		15	+ 0.5	+4644	3	122		16	+ 25.8	+3086	3
23		8	− 40.6	+4990	4	73	β	7	+ 0.8	− 28	1	123	k	12	+ 25.9	+1215	2
24		8	− 38.8	+4675	4	74	B	10	+ 0.8	+3937	1	124	a	11	+ 26.0	−2450	
25	(σ)		− 37.6	−3270		75		18	+ 1.5	− 175	3	125		14	+ 27.6	+3179	3
26		13	− 37.1	+ 809	3	76	y′	15	+ 2.1	− 692	3	126	l	13	+ 27.6	+2135	2
27	r	11	− 36.9	+ 294	1	77		14	+ 2.2	+4612	3	127		13	+ 27.9	−3130	3
28		14	− 36.8	−2689	3	78		18	+ 2.2	− 85	3	128		15	+ 29.3	−1534	3
29		12	− 36.6	+4310	4	79		15	+ 2.5	−1665	3	129		13	+ 29.7	−1711	3
30		16	− 35.7	− 198	3	80	y″	16	+ 2.6	− 675	3	130		16	+ 33.4	−1791	3
31	(υ)		− 34.3	−3990		81		16	+ 2.7	+ 648	3	131		16	+ 33.5	+2871	3
32	ξ	11	− 33.1	−1184	1	82	x	16	+ 3.2	− 901	3	132	(α)	11	+ 33.8	+4222	
33		14	− 31.6	+ 416	3	83		16	+ 3.2	−1756	3	133	θ	9.10	+ 34.5	+1262	1
34	M	8	− 29.2	+2729	1	84	w	14	+ 3.8	− 583	3	134		17	+ 35.6	+1327	3
35	o	10	− 27.0	−1123	1	85	J	10	+ 3.9	−3520	1	135	A	6.7	+ 38.2	+3528	1
36		16	− 26.3	+ 147	3	86	d	11	+ 3.9	−2688	1	136	κ	8	+ 42.3	− 261	1
37	K	10.11	− 24.3	+2460	1	87	ν	10	+ 4.3	− 412	1	137		15	+ 42.4	−1535	3
38		13	− 21.2	− 61	3	88		17	+ 4.9	+ 96	3	138	(β)	11	+ 42.9	+4093	
39		17	− 20.9	−2119	3	89	z	16	+ 5.6	− 686	3	139	(γ)	11	+ 50.9	+4567	
40	N	7.8	− 20.4	+1756	1	90		15	+ 5.9	+3033	3	140		14	+ 52.1	+4637	3
41		15	− 19.8	+ 101	3	91		17	+ 6.5	+ 238	3	141		16	+ 52.5	−1112	3
42		15	− 19.4	−2883	3	92		15	+ 6.8	+2798	3	142	(λ)	12	+ 53.8	+1110	
43		15	− 19.3	+2026	3	93	ε	5	+ 6.9	+ 386	1	143	X	5.6	+ 59.7	+3796	1
44		17	− 17.4	− 114	3	94		16	+ 7.6	−3027	3	144		15	+ 70.0	+5780	4
45	τ	11	− 16.3	+ 483	1	95		12	+ 8.4	+1851	3	145	S	8.9	+ 71.1	+ 214	1
46		16	− 14.8	−1959	3	96		16	+ 8.5	−2978	3	146		7 ?	+ 72.3	+5630	4
47		15	− 12.3	+1583	3	97		15	+ 8.7	−3321	3	147	T	11	+ 76.4	− 21	1
48	h	11	− 12.1	−2120		98		13	+ 8.9	−3625	3	148	V	9	+ 81.6	−3888	1
49	ι	7.8	− 11.0	−2760	1	99	c	11	+ 9.3	−2524		149	Y	10	+ 82.1	+1204	4
50		14	− 10.2	+ 516	3	100	G	14	+ 10.1	+ 548	3	150	U	10	+ 83.6	− 935	1

NOTE.—The following stars in this Catalogue are identified with stars observed by others:—

34 = M is Bode's 131 Orionis, and is identical with Messier's star No. 1 in his figure in Mem. Acad. Sci. 1771.

40 = N is Bode's 132 Ori. = Mess. No. 2.

49 = ι is Bode's 134 Ori. = Mess. No. 3.

53 = σ is Bode's 135 Ori. = Mess. No. 4.

69 = α is θ^1 Orionis = ASC. 679.

93 = ε is θ^2 Orionis = ASC. 681.

101 = ζ is Bode's 141 = Mess. No. 6.

108 = μ is Bode's 143 = Mess. No. 7.

110 = η is Bode's 146 = Mess. No. 8.

135 = A is Bode's 153 = Mess. No. 10.

143 = X is Bode's 155 = Mess. No. 11.

Note also, the star No. 63 in the above catalogue is perhaps two stars; at least in one diagram, without a date, I find another star 14m laid down beside it on the same parallel.

(60) In constructing the figure of the Nebula, Plate VIII.—The stars have been in the first place carefully laid down in their proper places, and with as much regard to their relative magnitudes as might consist with their representation by mere round black dots—every other mode of expressing them, either by annexed numbers or by rays, &c., being objectionable, as tending to confuse the details of the nebula and draw away attention from them. Among the stars so laid down the nebula has been afterwards worked in, from all the evidence of the several skeleton projections, and of other drawings from time to time obtained, compared *inter se*, paying very particular attention to the due expression of all those cases where some well defined portion of its contour, or other remarkable point of it were found to coincide nearly or exactly with one of the stars, so as to establish authentic landmarks, or fiducial points by which at any future time a perceptible shifting of position or change of form in the nebula may be certainly detected. The area of the figure (half a square degree in extent) comprises all the nebulous convolutions and appendages which I have been able to trace, with exception of a faint extension of the terminal effusion of the greater proboscis beyond the star A southwards, which may be traced as far as the double star ι Orionis which it involves, and renders nebulous. It is however of little intensity, and offers nothing remarkable enough in respect of form to have made it worth while to enlarge the dimensions of the engraving sufficiently to take in the whole. Northwards, between this nebula and that about C Orionis, as already above remarked in my account of that nebula, no nebulous connexion has been traced. An attentive consideration of our figure and Catalogue will give rise to some remarks which for distinctness we shall arrange under specific heads.

(61) *Of the Trapezium.*—In the Catalogue, the four large stars α, β, γ, δ as well as the fifth star γ' discovered by Struve in 1826, are laid down from the "micrometric measures" of that excellent observer, which, no doubt, exceed in accuracy any that I could have expected to procure. It is somewhat remarkable that in his elaborate discussion of the measured dimensions and position of the trapezium and this star in the "*mensuræ micrometricæ stellarum compositarum*," p. 242, no mention is made of the *sixth* star, (α' Trapezii) though at the date of some of the observations there recorded which come down as low as 1836, its existence could hardly have been unknown to him. This star has been seen by me on several occasions in the 20 feet reflector—viz. on December 25, 1832; November 25, and 29, 1834; January 29, 1835, and December 2, 1837, besides others of which the dates are not specially recorded. On the two last specified occasions micrometric measures were procured of its angular position from α, as compared with that of $\alpha\ \epsilon$ taken as a fiducial direction. These measures gave for the angle $\epsilon\ \alpha\ \alpha'$ respectively 20°.2 and 11°.5, the mean being 15°.8. If the disagreement of these should appear excessive, it will be recollected that in this case every circumstance which can add difficulty to or create uncertainty in such measurements conspires—extreme inequality, and close proximity of the stars directly compared, the disturbing near neighbourhood of three other very bright stars, unsymmetrically placed with respect to the wires and to each object—and the glare of the surrounding nebula, very different in its effect on the eye from the equable illumination of the field afforded by a lamp. This mean 15°.8, subtracted from 133°.0, the true position of ϵ from α gives 117°.2 for that of α' from the latter. Small as this star is, if the state of the atmosphere be favourable it does not require the full aperture

of 18 inches to render it visible. On the night of November 29, 1834, I find it recorded that "applying the aperture of 12 inches the sixth star a' was finely seen. It is excessively minute, and very close to a, much more so than γ' is to γ, say half the distance, and 14 mag., while $\gamma' = 12$ mag."* This estimate of distance however I consider too small, and in all probability the central distance $a\ a'$ may be reckoned at about 3″. Appended to this night's observations I also find the following note.—"N.B. In the interior of the trapezium, there exists positively no nebulosity, at least none comparable in intensity to that immediately without it." It may not be irrelevant to add also that on this occasion three measures (220·5, 215·1 : :, 222·8) were procured of the difference of positions between the lines of direction $\gamma\ \gamma'$ and $a\ \epsilon$, the mean of which 219° *added* (as in this case is necessary) to 133·0 the position of $a\ \epsilon$, gives for the position of γ' from γ 352°·5 which agrees well with M. Struve's position of this star (353°·6). Had only half the weight been allowed to the confessedly defective measure 215.5, the coincidence would have been almost perfect (353°·3). This is also the proper place to notice that the stars *within the trapezium*, marked Nos. 6, 7, 8, by Signor De Vico, as having been observed by him in February 1839, with the Cauchoix refractor of the Collegio Romano, have entirely escaped my notice. On the other hand no indication of the star a' (whose situation, fairly outside of the trapezium admits of no possibility of reconcilement with any of M. De Vico's interior stars) appears in his figure.—("Memoria intorno ad Alcune osservazioni fatte alla specola del Collegio Romano nel corraente anno 1838.")

(62) *Of other small stars near the Trapezium or otherwise remarkably situated, not noticed in my figure of* 1824.—Two exceedingly minute, but undoubted stars, Nos. 75 and 78 of our Catalogue are very remarkably placed on or very near the edge of the nebula at the bottom of the "fauces" or "great sinus." In Dr. Lamont's figure already referred to, a star which may be supposed identical with one of these (No. 75), from its allineations with other stars, is represented as deeply immersed in the nebula. The other seems to have escaped his notice, and so far as I am aware that of every other observer.

(63) I am indebted to my esteemed friend E. Cooper, Esq. late M.P. for Sligo, in Ireland, for several interesting remarks and observations at various times communicated by letter. In the year 1833, March 21, he was so good as to forward me a diagram exhibiting the situations of seven small stars interestingly situated, which had escaped my notice in 1824. Of these, six occur in the foregoing Catalogue, viz. Nos. 41, 44, 91, 100, 114, 117. The seventh, whose catalogued co-ordinates would be $-7^s{\cdot}75$ and $+227$ Parts. Micr., according to the place assigned to it by Mr. Cooper, has escaped my notice, or at least does not occur in the skeletons, so that if seen at all it has been only by transient glimpses. The place of this star is half way, in a strait line, between β (No. 73) and τ (No. 45.)

(64) The star marked x in my figure of 1824, suspected to exist in the middle of the "nebula oblongata" was not seen by Mr. Cooper, and I am now satisfied does not exist. On the other hand I find in his diagram a star very distinctly laid down, but not marked by him

* In the diagram made on this occasion, the letters β and γ are transposed, and the stars γ, γ^1 are called β, β^1. This misnomer is of course rectified in the text.

as a new one, though no such star occurs in my former figure in the exact place of No. 82, in the "maxilla inferior" near the double star y′ y″. This star I find in only one of my skeletons, and though quite unequivocally marked, it has no magnitude attached, and the letter y is placed adjacent to it, instead of being affixed to the double star y′ y″, both individuals of which are also laid down, of the same apparent size as that in question. Had it not been therefore for the insertion of this star (though under doubtful circumstances) in Mr. Cooper's diagram, I should have perhaps hesitated to admit it into my Catalogue as I have now done, transferring to it the letter x which remained otherwise unoccupied.

(65) Mr. Cooper suspects the star No. 41, to be double. No. 117 (p of the Catalogue) affords him occasion for a remark of considerable interest and importance, as it goes to prove that the relative situation of the nebula and this star underwent no change in the interval between 1833 and 1837. For he states the star in question to be situated "on the very edge of the stream of light" (meaning the "*proboscis major*") which was also precisely its situation at the later epoch. He makes however no mention of its minute companion q (No. 121).

(66) The two small stars Nos. 51 and 57, near the trapezium, and No. 81, outside of the "Front" towards its rectangular junction with the "occiput" in the faint (and hitherto unnoticed) effusion of the nebula which prolongs the "Sinus Gentilii" outwards, have in like manner eluded the scrutiny of all other observers so far as their observations are known to me. Of Nos. 88 and 91, Dr. Lamont has one, and Mr. Cooper the other.

(67) *Of Evidences of change in the Nebula.*—To the reader who has never viewed this object through powerful telescopes, but who is familiar with the various representations which have from time to time been made of it (including my own of 1824), the number and complexity of the various branches and convolutions now first exhibited, and the different aspect under which even the portions best known are now presented, will no doubt tend to convey a strong impression of great and rapid changes undergone by the nebula itself. I am far from participating in any such impression. Comparing only my own drawings made at epochs (1824 and 1837) differing by thirteen years, the disagreements, though confessedly great, are not more so than I am disposed to attribute to inexperience in such delineations (which are really difficult) at an early period—to the far greater care, pains, and time bestowed upon the later drawings—and above all to the advantage of local situation and the very great superiority in respect both of light and defining power in the telescope at the latter over what it possessed at the former epoch, the reasons of which I have already mentioned. These circumstances render it impossible to bring the figures into comparison except in points which could not be influenced by such causes. Now there is only one such particular on which I am at all inclined to insist as evidence of change; viz. in respect of the situation and form of the "nebula oblongata," which my figure of 1824 represents as a tolerably regular oval extended very nearly in a right line, or at most but a very little curved upwards between the two stars χ = No. 120—and κ = No. 136 of the Catalogue. Comparing this with its present appearance as exhibited in Plate VIII. it seems hardly possible to avoid the conclusion of some sensible alteration having taken place. No observer now, I think, looking ever so cursorily at this point of detail, would represent the broken, curved, and unsymmetrical nebula in question (lying, as it does, in its whole extent, clearly out of the line of junction of the two stars above mentioned), as it is represented in the earlier

of the two figures: and to suppose it *seen* as in 1837, and yet *drawn* as in 1824, would argue more negligence than I can believe myself fairly chargeable with.

(68) There is another point on which considerable stress might be laid, were I satisfied that the earlier diagrams on which it turns were done with sufficient care. In 1837, the nebulous spur towards the end of the great proboscis, which terminates at E (No. 111), certainly was neither joined to the proboscis itself, nor directed towards the star A (No. 135), but rather towards a point about one-third of the distance from A (No. 135), to C (No. 126), near to where there is a small star 16m (No. 131). Now I find two diagrams, one of December 25, 1832, the other of November 25, 1834, in which this spur is represented as running directly from A to E, and forming a complete hook, no way disjoined from the proboscis. But the chief attention on the first of these occasions was directed to the magnitudes and situations of the stars, and the hook seems to have been only roughly sketched in as a novelty to be further noticed in future, while on the last it is only very faintly indicated, in a diagram of the stars adjacent to θ Orionis on all sides, preparatory to the formation of chart intended to take in both ι Orionis on the one side and C Orionis on the other, which was subsequently discontinued.

(69) Still less can we insist, as evidences of change, on such particulars as the curiously notched outline of the "Nebula Mairanni" about the star μ (No. 108), now for the first time represented; or on the intricately rifted and broken state of the frontal and occipital region of the principal nebula. I ought to mention here that (owing no doubt to the difficulty of properly representing on paper and by lamp-light an object of the kind, I find a good deal of disagreement in respect of the number, size, and distribution of the portions into which it may be considered as broken up, not only between my present figure and Dr. Lamont's, but between my own drawings of this part on several nights. But the most material difference between Dr. Lamont's figure and mine consists in the characteristic forms of these portions, which he represents as rounded masses more or less detached from or running into each other and into a general nebulous ground; while in all my later drawings the effect is rather that of a tolerably uniform surface marked with branching rifts or channels, like roads. There is one peculiarity in Dr. Lamont's figure which I can no way reconcile to my own impressions; viz., the strangely different form and magnitude which he assigns to the "Sinus Gentilii," from what I have always found it. This is a point which I trust he will be induced to re-examine.

(70) η *Argus and the great Nebula surrounding it.*

Plate IX. η Argus = h. 3295 = Δ. 309 = Lac. 968 = Brisb. 3198. R A. 10° 38′ 38″ N P D 148° 47′.

There is perhaps no other sidereal object which unites more points of interest than this. Its situation is very remarkable, being in the midst of one of those rich and brilliant masses, a succession of which curiously contrasted with dark adjacent spaces (called by the old navigators coal-sacks), constitute the milky way in that portion of its course which lies between the Centaur and the main body of Argo. In all this region the stars of the milky way are well separated, and, except within the limits of the nebula, on a perfectly dark ground, and on

an average, of larger magnitudes than in most other regions. Some idea of their numbers may be formed from the following "star-gages," or numbers counted in single fields of view taken without partiality or selection in sweep 543 in the middle of the zone extending from N P D 147° to 150°, which is almost exactly in the parallel of η Argus, viz.:—

R A = 9^h 38^m—Stars in field . .	93	R A 10 30—Stars	224
9 50 „ . .	125	11 24 „	250
10 10 „ . .	106	11 35 „	140
10 26 „ . .	144		

The mean of these gages which extend about an hour in R A on either side of the Nebula, is 154, which being the number of stars in a circle 15′ in diameter gives an average of 3138 to the square degree (in the denser part at 11^h 24^m, the gage being 250, the number to the square degree would amount to 5093). From this it appears that in these two hours, during which the area of the heavens swept over consisted of $3° \times 30° \times \sin 148°\ 30' = 47.03$ square degrees, the amazing number of 147,500 stars must have passed under review.

(71) In the midst of this vast stratum of stars occurs the bright star η Argus, an object in itself of no ordinary interest on account of the singular changes its lustre has undergone within the period of authentic astronomy. For while in Halley's Catalogue (constructed in 1677) which is the first which can be entirely depended upon, it is marked as of the 4th magnitude, yet in Lacaille's and the subsequent Catalogues of Brisbane, Johnson, Fallows, and Taylor, it is made to rank as of the second. When first observed by myself in 1834, it appeared as a very large star of the second magnitude, or a very small one of the first, and so it remained without apparent increase or change up to nearly the end of 1837, in November of which year* it was noticed of its usual brightness, or at least without exciting any suspicion of a change. Nor had any such suspicion been excited during a series of photometric comparisons set on foot in the beginning of 1836, and carried on whenever fitting opportunities occurred, with the express object of establishing a scale of southern magnitudes, and in which this star had been frequently compared with others both superior and inferior to it in brightness. In these comparisons its rank was always judged to be superior to that of β Crucis, γ Crucis, β Argus, ϵ Canis, and Pollux, and always inferior to Spica, α Crucis, Antares, and Aldebaran; equal or a little superior to Regulus, and a good match with Fomalhaut. Estimating its magnitude numerically from these data, on a scale in which each magnitude is supposed to be divided into ten degrees or decimals, assigning to Rigel the magnitude 1·0, and to β Argus 2·0, that of η would be 1·4, in the whole interval of time from February 1834 to November 1837.

(72) It was on the 16th December, 1837, that resuming the photometrical comparisons in question, in which, according to regular practice, the brightest stars in sight in whatever part of the heavens were first noticed, and arranged on a list, my astonishment was excited by the appearance of a new candidate for distinction among the very brightest stars of the first

* Leaving off a sweep one night in November, I noticed it rising above some trees in the S.E., on which occasion I remarked to my attendant, that "η Argus was getting up, and that it would soon be time to begin another year's observations on the nebula." This remark was subsequently recalled forcibly to recollection, but the precise date could not be recovered.

magnitude, in a part of the heavens with which being perfectly familiar, I was certain that no such brilliant object had before been seen. After a momentary hesitation, the natural consequence of a phenomenon so utterly unexpected, and referring to a map for its configurations with the other conspicuous stars in the neighbourhood, I became satisfied of its identity with my old acquaintance η Argus. Its light was however nearly tripled. While yet low it equalled Rigel, and when it had attained some altitude was decidedly greater. It was far superior to Achernar. Fomalhaut and α Gruis were at the time not quite so high, and α Crucis much lower, but all were fine and clear, and η Argus would not bear to be lowered to their standard. It very decidedly surpassed Procyon, which was about the same altitude, and was far superior to Aldebaran. It exceeded α Orionis, and the only star (Sirius and Canopus excepted) which could at all be compared with it was Rigel, which, as I have stated already, it somewhat surpassed.

(73) From this time its light continued to increase. On the 28th December it was far superior to Rigel, and could only be compared with α Centauri which it equalled, having the advantage of altitude, but fell somewhat short of it as the altitudes approached equality. The maximum of brightness seems to have been obtained about the 2nd January, 1838, on which night both stars being high and the sky clear and pure, it was judged to be very nearly matched indeed with α Centauri, sometimes the one, sometimes the other being judged brighter, but on the whole α was considered to have some little superiority. After this the light began to fade. Already on the 7th, 13th January, α Centauri was unhesitatingly placed above, and Rigel as unhesitatingly below it. On the 20th, it was "visibly diminished—now much less than α Centauri, and not *much* greater than Rigel. The change is palpable." And on the 22nd, Arcturus (the nearest star in light and colour to α Centauri which the heavens afford) when only 10° high surpassed η, the latter being on the meridian; η was still however superior to β Centauri, α Crucis and Spica, and continued so, (and even superior to Rigel) during the whole of February, nor was it until the 14th April, 1838, that it had so far faded as to bear comparison with Aldebaran, though still somewhat brighter than that star.

(74) Beyond this date I am unable to speak of its further changes from personal observation. It appears however since that time to have made another and a still greater step in advance, and to have surpassed Canopus, and even to have approached Sirius in lustre, the former of which stars I estimate at double, the latter at more than the quadruple of α Centauri, so that Jupiter and Venus may possibly come to have a rival among the fixed stars in Argo, as they have on recorded occasions had in Cassiopeia, Serpentarius, and Aquila. This subsequent increase was first communicated to me in a letter from the Rev. W. S. Mackay, General Assembly's Mission, Calcutta, of which the following is an extract. "To my great surprise I observed in March last (1843), that the star η Argus R A, $10^h\ 39^m$ decl. 58° 51′ S. had become a star of the first magnitude fully as bright as Canopus, and in colour and size (*sic in MS.*)* very much like Arcturus. This has been observed by several other persons to

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* A distinction seems here to be taken between the *brightness* and *size* of a star, which I do not understand. Canopus has at least double the light of Arcturus. η Argus belongs to the class of ruddy or yellow stars, as do also α Centauri and Arcturus.

whom I pointed it out. Is the star known as a variable star, or is the change now first observed? α Crucis looked quite dim beside it."

(75) This further remarkable increase in March 1843, to a brightness exceeding that of Canopus, is fully established by a series of comparisons made at my request since December 29, 1842, by my excellent friend Mr. Maclear, at the Cape, from which it appears that on the last mentioned date it was equal to β Centauri, but inferior to α, and that during the first half of January, Procyon and Rigel, were the stars with which it was most comparable. From this time until March 8, Mr. Maclear's observations were interrupted. On that day "it was particularly brilliant at midnight," and "on the 11th and 14th, it was "much brighter than α Centauri" and Rigel, "and even brighter than Canopus." On the 19th it had become however "less brilliant than on the last three nights," and (as appears by a letter from Mr. Maclear, dated on the 28th) considerably less than Rigel, and even less than α Crucis, though still much greater than α Hydræ. On the 24th it had begun to advance again, as Mr. Maclear states it to have been on that night "decidedly not so brilliant as Canopus," but still "brighter than α Centauri"—and on the 28th again, "still less brilliant." We have here an epoch of great interest, a temporary minimum, with a kind of trepidation or fluttering of light—followed however by another step in advance even yet more extraordinary—for by a subsequent letter dated September 17, 1844. Mr. Maclear referring to these observations, says, "the changes of η Argus are curious, for last April, twelve months it seemed almost equal to Sirius,—I speak as to date without my notes. Now the star is stationary and scarcely so bright as Canopus." Lastly, on the 3rd January, 1845, Mr. Maclear writes as follows to the Astronomer Royal—"When you see Sir J. Herschel, tell him that η Argus has been for some time rather larger than Canopus, and seems again on the decline."

(76) Since my return to England, the following memorandum has been communicated to me by the late Professor Henderson, from which it would appear that in the interval between Lacaille's observations in 1751, and the period of Mr. Burchell's residence and travels in South Africa, the star had receded from its magnitude as observed by Lacaille (2m or as Bode states it 3m) to the fourth magnitude, as in Halley's time, and again increased to the first, from which however it must once more have retrograded previous to 1834. Mr. Henderson's memorandum runs as follows:—

"Mr. Burchell wrote July 17, 1827, to J. Duncan from St. Paulo, near Rio Janeiro, and said, 'I am curious to know whether any one has hitherto noticed that the star η Navis which is marked as being of the fourth magnitude (*and which was always so when I was in Africa*) is now of the first magnitude, *or as large as α Crucis*.'" On further inquiry relative to this curious observation, I have been favoured by Professor Johnson with the communication of the following note from Mr. Burchell himself.

"Fulham, 9th June, 1845.

"Dear Sir.—I regret that I have so long been prevented by illness from complying with the request you made when I had the pleasure of meeting you at Dr. Kidd's. I now find on reference to my journal of Astronomical Transactions under the date of February 1, 1827, when I was at the city of St. Paulo in Brazil, that the star η *Navis*, marked as a star of the fourth magnitude by Lacaille, [? Halley] then appeared to be of the first and as large

as *α Crucis:* and that there was no star of this magnitude in that part of the heavens when I was in Africa (in 1811—1815): nor, as I believed when I was at Rio de Janeiro (in 1825—1826) as I think it would not have escaped my notice in the latter place. And that on the 20th February, 1828, when I was at the city of Goyaz in Brazil, I measured the angular distance between this star and *β Crucis,* which I found to be 15° 20′ 19″, and on the 29th of the same month, its distance from *β Navis,* which was 13° 16′ 29″, and made a memorandum that it was then certainly of the second magnitude at least.

"If these memoranda should prove of any use it will give me great pleasure, and I remain,

"Dear Sir,

"Yours very truly,

(signed) "Wm. J. Burchell."

"Mr. Johnson, Observatory, Oxford."

(77) A summary of the observed magnitudes will stand as follows:—

Date.	Authority.	Magnitude.	Date.	Authority.	Magnitude.
1677.	Halley.	4	1838. Jan. 2.	Herschel.	7 1, = α Crucis, very nearly = α Centauri.
1751.	Lacaille.	2			
1811-1815.	Burchell.	4			
1822.	Fallows.	2 *	1842. Mar. 19.	Maclear.	∠ 1, inferior to α Crucis.
1822-1826.	Brisbane.	2			
1827. Feb. 1.	Burchell.	1 = α Crucis.	1843. April.	Maclear.	7 1, nearly equal to Sirius.
1828. Feb. 29.	Burchell.	2..1			
1829-1833.	Johnson.	2	1843. April 11-14.	Mackay.	Fully as bright as Canopus.
1832..1833.	Taylor.	2			
1834..1837.	Herschel.	1..2			

(78) A strange field of speculation is opened by this phenomenon. The temporary stars heretofore recorded, have all become totally extinct. Variable stars so far as they have been carefully attended to, have exhibited periodical alternations in some degree at least regular, of splendour and comparative obscurity. But here we have a star fitfully variable to an astonishing extent, and whose fluctuations are spread over centuries, apparently in no settled period, and with no regularity of progression. What origin can we ascribe to these sudden flashes and relapses? What conclusions are we to draw as to the comfort or habitability of a system depending for its supply of light and heat on so uncertain a source? It is much to be regretted that we are without records of its changes in the intervals between the observations of Halley and Lacaille, and those of Lacaille and Burchell. Its future career will be a subject of high physical interest. To this account I will only add that in the beginning of 1838, the brightness of this star was so great as materially to interfere with

* In Fallow's catalogue the star is mis-lettered σ, but the place is that of η.

the observation of that part of the nebula surrounding it which is situated in its immediate vicinity, and, in particular, almost to obliterate that extremely curious oval or lacuna which forms so conspicuous a feature in the figure of the nebula annexed, and of which, had I not previously secured a correct representation, I should then scarcely have been able to have done so to my own satisfaction.

(79) The accurate representation of this nebula with its included stars has proved a work of very great difficulty and labour, owing to its great extent, its complicated convolutions, and the multitude of stars scattered over it. To say that I have spent several months in the delineation of the nebula, the micrometrical measurement of the co-ordinates of the skeleton stars, the filling in, mapping down, and reading off of the skeletons when prepared, the subsequent reduction and digestion into a catalogue, of the stars so determined, and the execution, final revision, and correction of the drawing and engraving, would, I am sure, be no exaggeration. Frequently, while working at the telescope on these skeletons, a sensation of despair would arise of ever being able to transfer to paper, with even tolerable correctness, their endless details. However, by breaking it up into parts, and executing each part separately, it has been accomplished, and I trust with such exactness as may afford a record capable of being appealed to in future whenever the question of internal changes of the form and situation of the nebulous branches shall be gone into.

(80) The area occupied by the figure Plate IX. of this nebula, extends in right ascension from $-3^m\ 45^s$ to $+3^m\ 0^s$ from the principal star, and in polar distance from $-24'$ to $+44'$, comprising in the whole an area of almost exactly a square degree. Of this about four-sevenths are occupied by the nebulous branchings and their included vacuities, and this portion only I have thought it requisite to triangulate and catalogue. The number of stars within this area whose places have been determined is 1203, being at the rate of 2105 to the square degree, from which it would appear either that small stars which would have been conspicuous on a dark ground have escaped notice in the glare of the nebula, or that the nebula itself is situated in a spot somewhat less crowded than the general average of the milky way in its immediate neighbourhood.

(81) In the engraving, those stars only are laid down which are entered in the Catalogue accompanying this description as of the twelfth magnitude and upwards, with exception, first, of such stars as are so situated with respect to some well defined edge or other remarkable feature of the nebula as to serve as marks by which any future change of form in the latter may be certainly recognised:—secondly, of small stars in the immediate neighbourhood of the large one (especially two very minute ones almost close to it, and which the increased light of the large star had completely obliterated before the conclusion of my observations):—thirdly, of the small stars of the clustering groups about the stars O, F, and γ of the Catalogue, and of two remarkable elliptic groups on the parallel of $+ 6000$ micrometer parts in the engraving:—fourthly, of the small stars immediately adjacent to, and included within, the remarkable oval vacuity which is crossed by the parallel of $+ 9000$ Pts., and, lastly, of a few others nearly adjacent to larger stars, with which they may be considered to form double stars. To have laid down all the stars observed would have added greatly to the probability of undetected errors in the engraving, without answering any adequate

purpose, the Catalogue being at hand, by which any future observer may satisfy himself whether any particular star he may wish to identify has been seen by me or not.

(82) It would manifestly be impossible by verbal description to give any just idea of the capricious forms and irregular gradations of light affected by the different branches and appendages of this nebula. In this respect the figure must speak for itself. Nor is it easy for language to convey a full impression of the beauty and sublimity of the spectacle it offers when viewed in a sweep, ushered in as it is by so glorious and innumerable a procession of stars, to which it forms a sort of climax, justifying expressions which, though I find them written in my journal in the excitement of the moment, would be thought extravagant if transferred to these pages. In fact, it is impossible for any one with the least spark of astronomical enthusiasm about him to pass soberly in review, with a powerful telescope and in a fine night, that portion of the southern sky which is comprised between 6^h and 13^h of R A, and from 146° to 149° of N P D, such are the variety and interest of the objects he will encounter, and such the dazzling richness of the starry ground on which they are represented to his gaze.*

(83) There are, however, certain features to which it is necessary to refer more particularly in illustration of our figure. It must be observed in the first place, that in no part of its extent does this nebula show any appearance of resolvability into stars, being in this respect analogous to the nebula of Orion. It has therefore nothing in common with the milky way, on the ground of which we see it projected, and may therefore be, and not improbably is, placed at an immeasurable distance behind that stratum.

(84) The whole extent of the nebulosity to the south is somewhat greater than can be included in the figure, but it grows so faint beyond the oval vacuity in the upper part that I have not considered it necessary to trace it beyond that limit. Nor am I quite sure that the south following portion of the area of the figure in which no nebula is represented is in reality absolutely free from it. The interior of the oval above mentioned is perfectly so. It is also nearly devoid of stars, four very minute ones (inserted in their proper places in this figure) Nos. 243, 268, 274, 278, of the Catalogue only having been perceived within it. Great attention has been paid to exactness in the situations of the minute stars Nos. 229, 235, 237, 239, and 309 (ζ'') of the Catalogue, which mark out the form of this oval with respect to its borders. The two large stars π and ω on its south following side are fairly immersed in the *nebula*, as are also No. 225 ($= \mu''$) on its south preceding, and Nos. 276 and 297 at its northern extremity.

(85) Close to the great star A, is situated that singular lemniscate-oval vacuity which forms so strange a feature of this nebula. Its area is not entirely devoid of light. A thin

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* The first three hours of the zone thus marked out are remarkable for their fine double stars. Among the nebulæ which occur from 9^h to 12^h, we have at $9^h\ 17^m$, 147° 36′, the beautiful planetary nebula h. 3163, a perfect planet in appearance, with an attendant satellite; at $10^h\ 11^m$, 147° 8′, the falcated nebula h. 3239; at $10^h\ 38^m$, 148° 47′, η Argus with its nebula; at $10^h\ 58^m$, 147° 49′, the superb cluster h. 3315; at $11^h\ 42^m$, 146° 14′, the *blue* planetary nebula h. 3365, a most exquisite and unique object; and at $12^h\ 44^m$, 149° 26′, the beautiful cluster of various coloured stars about κ Crucis (h. 3435), figured in Pl I. fig. 2.

nebulous veil seems as if extended over its northern loop on the preceding side. Four stars, Nos. 686, 603, 589, and 670 (= [w]) of the Catalogue are placed precisely on its edges, and will serve as excellent detectors of change in its form, should any occur. The stars Nos. 607, (= [t]) 664 (= [v]), and 616, though near the edge, are yet fairly immersed in the nebula. On the other hand [u] No. 634, situated in the contraction of the oval towards its middle, though also near the edge, is yet fairly within the vacancy, and so situated that the slightest shifting of the nebulous contour at its preceding side cannot fail to be rendered sensible. In like manner also the exceedingly well defined outline of the nebulous mass in which the cluster and double star O occur (between — 50^s and — 100^s in R A, and — 1000 and — 2000 Pts. in N P D), has its situation admirably identified by the double star v (Nos. 322, 323), which is situated very close to, but yet fairly within, its preceding edge: the edge actually passing between v and an extremely minute star of the seventeenth magnitude (No. 318), and being moreover marked out by the two stars, Nos. 333 and 342, the former of which is precisely on it; as also by the stars No. 311 and No. 299 = (ρ) the former considerably within, the latter considerably without the nebula, whose edge passes between them, a little nearer to No. 311 than to (ρ). Similarly the star o, No. 803, and o', No. 813, one on each side of the remarkable nebulous projection whose co-ordinates are + 25^s and — 2500 Pts., afford means of ascertaining any relative movement in this part of it.

(86) In the catalogue of stars occurring in this nebula, hereto subjoined, the letters variously marked and accented which occur in the second column indicate (with a few exceptions of stars otherwise remarkable) those stars which have been used as the summits of triangles into which the nebulous area was divided for the formation of the working skeletons. Among these, such as exceed the 12th magnitude, and some also of that and even of inferior magnitudes have had their places determined by differences of R A and N P D taken with the equatorial. It would merely multiply superfluous figures to state the particulars of these differential measurements. Suffice it to say that upwards of a thousand such differences, viz. 544 in R A, and 474 in N P D, were taken with great care on the nights of the 25th December, 1834; February 24, 1835; April 1, 4, 16, 25, 26, 28, May 5, June 27, 28, 1836; April 27, May 8, 9, 14, 16, 17, 28, and 29, 1837—from which the places of the stars of the 1st class in the Catalogue (138 in number) were derived. On the 28th February, and the 1st and 2nd March, 1834, also a series of angles of position, 90 in number, was taken with the position micrometer of the 20-feet reflector which when projected graphically on a scale sufficiently large to afford the requisite exactness, furnished the co-ordinates of about 50 stars. About 20 of these, not being included already in class 1, or whose co-ordinate in R A only could be determined by differential observations, owing to their faintness not allowing bisection by the declination wires of the equatorial, have the class 2 annexed to them in the Catalogue. Their places are probably correct to $0^s.7$ of time in R A, and to $6''$ or $7''$ in N P D, judging from the mean errors of such stars determined in this manner as are included in class 1.

(87) Classes 3 and 4, result from the reading off and reduction of the skeleton-diagrams, the stars of class 3 being summits of triangles of the second order, formed by breaking up the larger triangles, whose extent was judged to be too great to allow of a sufficiently precise filling in by eye-draft. Those of class 4 are stars simply mapped down and read off. The former, from the use to which they were to be applied, having been laid down probably with more

deliberate care than the latter, they are classed separately. A few stars of class 3 have their right ascensions differentially observed.

(88) The filling in of the triangles, both as regards the small stars they include, and the course and graduation of the nebula within their respective areas, was performed in the only way in which such an operation is practicable, that is to say by eye-draft, unaided by any process of measurement other than mental comparison with the sides and angles of the triangles. The nature of the process, as well as that of the reading off and correction of the places of the stars so mapped down, has been already described in speaking of the nebula of Orion; but as in this case a much greater number of stars had to be determined, and in consequence the occasions of observation were much more numerous, it frequently happened that only single triangles, or perhaps two or three adjacent ones, could be executed at once, and *that* in several instances before the data for the construction of complete skeleton charts were accumulated. Thus several triangles came to be mapped down more than once, and when afterwards a series of skeletons of sufficient precision was executed, it was considered advisable, not indeed to reject all the former work, but to go over it *de novo* wherever it seemed likely to be defective. Thus it happened that on the final reading off and assemblage of the places of the stars for the purpose of arranging them in a Catalogue, among the stars not included in classes 1 and 2, 218 were found to have been determined by two such skeleton-readings, 55 by 3, 5 by 4, and 1 by 5. In all such cases, means were taken, unless where good reason was found for rejecting one or more of the readings as influenced by some obvious cause of error; but of this there are few instances, and in the vast majority of cases the deviations even of the extreme readings from the adopted mean were found to be of trifling importance. Taking for instance the extreme deviations in N P D in the 279 cases above enumerated, their numbers and amounts stand classed as follows.

Deviations in Micrometer Parts, of which 50 = 12″.			Number of Instances.
0	and under	10	60
10	„	20	63
20	„	30	54
30	„	40	39
40	„	50	22
50	„	60	16
60	„	70	10
70	„	80	4
80	„	100	3
100 and upwards			8
			279

(89) To the operation of filling in the triangles, and otherwise delineating the general aspect or minuter particulars of the nebula, the following nights were wholly or partially devoted. February 27, 28, March 1, 2, December 25, 1834; April 15, May 11, June 7, 8, 10, 14, 17, 21, July 8, 1836; April 24, 28, 29, 30, May 1, 4, 6, December 21, 22, 1837. Angles of position were also measured of small companions near the central star in sweeps 432, 433, 434, 435 on the nights of March 14, 16, 31, and April 1, 1834.

(90) The magnitudes assigned to the stars in the Catalogue are means of all which have been found ascribed to them in any recorded observation or diagram. Some, it will be observed, are noted as double. A summary of their angles of position and distances is contained in the following Table.

No. in Catal.	Letter.	Mag.	Angle of Position.	Distance measured or estim.	ΔRA. Sec. Dec.	ΔNPD. Pts. Dec.	Epoch.
36, 37	(g)	10,12	306°.4	5″.4 skel.	−0.56	−13.33	1837.65
45, 46	p	10,12	352.8	7″.10 skel.	−0.11	−29.26	1837.71
236, 238	S	8,15	s f	skel.	+0. 3	+45	1837
322, 323	(*v*)	13,13	179.8	3 est.	+0.00	+12.48	1837.76
354, 361	Z‴	11,12	226.7	15″.1 skel.	−1.42	+43.21	1837.48
370, 381	t	11,12	79.5	15″.4 skel.	+1.96	−11.75	1837.34
403, 404, 395	O	8,10 8,..	150.3 309.3	2½ est. 10 est.	+0.16 −0.97	+ 9.46 −26.35	1837.02 1837.97
426, 430	P	9,15	156.2	11.5 skel.	+9.60	+43. 5	1837.34
429, 434	Z″	9,11	236.4	7″.8 skel.	−0.84	+17.99	1837.28
433, 435	Z′	9,11	199.3	8″.4 skel.	−0.36	+33.03	1837.22
452, 455, 458	K¹	8, 8	108.0	13.4 meas.	+1.64	+17.22	1836.30
	K²	9=9	116.9	2.4 meas.	+0.28	+ 4.66	1836.89
468, 490	C	8,12	s f	skel.	+3. 2	+96	1837
476, 486	(p)	10,17	s f	skel.	+1. 3	+30	1837
571, 575	D	8, 9	213.6	17.9 meas.	−1.28	+62.02	1836.91
597, 601	..	11,11	199.4	13″.8 skel.	−0.59	+54.30	1837.34
618, 619	γ	8, 9	351.8	6.7 meas.	−0.12	−27.59	1837.03
723, 728, 730	A	1,12 1,13	46.8 32.1	12 est. 14 est.	+1.13 +0.96	−34.17 −49.34	1834.20 Do.
862, 867	β	8,12	41.6	13.2 skel.	+1.14	−40.91	1837.76
918, 926	m				+1. 3	−78	1836....
1013, 1018	a	10,13	35.8	17.8	+1.34	−60.02	1837.97
1215, 1216	θ	8,10	115.2	9.1 meas.	+1.06	+16.12	1836.31

A GENERAL CATALOGUE OF THE STARS

Known to exist in the area occupied by the great Nebula about η Argus, within the limits of Right Ascension and Polar Distance comprised in the Monograph Chart.

(N.B.—Interlined words refer to the Star immediately above them.)

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
1	L	7	−224.5	+4394	1
2	X	7	−220.6	− 35	1
3	[b]	12	−209.0	+ 732	3
4	e˘	11	−203.0	+2408	3
5	(b)	10	−202.8	− 253	1
6		11	−198.7	+3974	4
7		12	−197.0	+3939	4
8		14	−194.0	+1574	4
9	[a]	13	−191.9	+1363	3
10	l		−186.5	+5411	1
11		15	−185.1	+2300	4
12	(c)	10	−183.9	+ 84	1
13		16	−183.0	+2598	4
14		12	−182.0	+3804	4
15		16	−181.9	+2875	4
16		12	−181.5	+3894	4
17		12	−181.0	+3944	4
18		16	−180.9	+5226	4
19		14	−180.8	+3330	4
20	r	10	−179.6	+2270	1
21		16	−178.3	+5174	4
22		14	−178.2	+3245	4
23		13	−177.7	+3620	4
24		16	−177.1	+5073	4
25		16	−176.1	+5384	4
26		15	−175.7	+3370	4
27		16	−175.5	+2621	4
28	σ˘	9	−175.4	+6931	1
29		16	−175.3	+4100	4
30		15	−175.0	+3480	4
31		15	−174.1	+3542	4
32	(h)	12	−173.6	+3104	1
33	h˘	9	−172.6	−5227	1
34		15	−172.2	+6831	4
35		16	−171.3	+5301	4
36	(g)	12	−171.0	+3362	4
37		9	−170.4	+3375	1
			double		
38		13	−169.3	+4294	4
39		15	−168.9	+5139	4
40		13	−168.6	+6641	4
41		15	−168.3	+7949	4
42		14	−168.2	+5049	4
43		16	−167.8	+3527	4
44		14	−167.7	+5169	4
45	p	12	−167.6	+4240	4
46		10	−167.5	+4269	1
			double		
47		12	−167.0	+6836	4
48		13	−166.8	+6701	4
49	(n)	11	−166.6	+8425	1
50		13	−166.4	+3703	4
51		14	−166.3	+5049	4
52		16	−166.3	+5261	4
53		16	−166.1	+3400	4
54		14	−165.8	+4800	4
55		13	−165.0	+5166	4
56		11	−164.3	+7432	4
57		15	−163.1	+4820	4
58		13	−163.0	+8355	4
59		13	−162.8	+6756	4
60		14	−162.4	+6133	4
61		16	−161.8	+7402	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
62		14	−161.5	+2301	4
63		16	−161.3	+7889	4
64		11	−160.3	+5112	4
65		13	−159.7	+6143	4
66		12	−158.6	+5248	4
67		15	−158.5	+4198	4
68		13	−158.5	+7055	4
69		14	−158.3	+5032	4
70		16	−157.5	+8425	4
71		16	−157.4	+7680	4
72		12	−157.1	+4059	4
73		15	−157.1	+2572	4
74		15	−156.7	+4668	4
75		13	−155.5	+6443	4
76		14	−155.2	+2542	4
77		12	−155.0	+7983	4
78		15	−154.9	+8479	4
79		16	−154.9	+5894	4
80		16	−153.7	+5690	4
81		14	−153.6	+2284	4
82		15	−153.3	+8790	4
83	z˘	11	−153.1	+ 254	3
84		13	−152.4	+8134	4
85		15	−152.1	+8660	4
86		13	−151.3	+6667	4
87		15	−151.2	+6727	4
88		16	−150.8	+5594	4
89		13	−150.2	+4852	4
90		13	−150.2	+3793	4
91		13	−150.1	+5058	4
92		12	−150.0	+5360	4
93		13	−148.6	+6553	4
94		16	−148.3	+3350	4
95	w	8	−148.0	−1332	1
96		15	−147.7	+7722	4
97		15	−147.6	+8010	4
98		11	−146.9	+5393	4
99	y˘	12	−146.4	+1098	3
100		15	−146.1	+7717	4
101		14	−145.7	+8204	4
102		16	−145.7	+3379	4
103		12	−145.6	+2265	4
104		16	−145.3	+8824	4
105		16	−145.3	+8749	4
106		12	−144.7	+7558	4
107		14	−144.5	−1517	4
108		16	−144.2	+8607	4
109		12	−144.1	+1340	4
110		15	−144.1	+8492	4
111		16	−144.0	+4973	4
112	θ˘	14	−143.6	+9304	1
113		16	−143.5	+4882	4
114		11	−142.6	+4667	4
115		15	−142.5	+3697	4
116	k	10	−142.2	+5421	1
117	z	12	−142.2	−2943	3
118		12	−141.4	+2644	4
119		16	−140.3	+4275	4
120	v˘	12	−139.8	+2015	3
121		11′	−138.8	+2704	4
122		13	−138.6	+5082	4
123		14	−138.4	−2771	4
124		16	−138.2	+4364	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
125		15	−138.0	+6700	4
126		15	−137.5	+8341	4
127		16	−136.8	+3593	4
128		16	−136.7	+5992	4
129	(o′)	10	−136.6	+8057	1
130		16	−136.3	+4908	4
131		15	−136.2	+6658	4
132		16	−136.1	+4282	4
133		15	−136.0	+6566	4
134		16	−135.8	+4928	4
135		13	−135.4	+5942	4
136	(e)	9	−135.3	+3327	1
137		12	−134.8	+5075	4
138		15	−134.5	+4898	4
139		15	−134.5	+6027	4
140		13	−134.4	+8916	4
141		14	−134.3	+8606	4
142	(f)	10	−133.8	+2842	1
143		15	−133.8	+7794	4
144		14	−133.1	+4908	4
145		16	−133.0	+9068	4
146		16	−132.6	+8444	4
147	(o)	9	−132.2	+7759	1
148		14	−132.1	−1645	4
149		13	−132.1	+8556	4
150		16	−131.7	+9058	4
151		16	−131.5	+7769	4
152		15	−131.3	+7799	4
153		13	−130.6	+3119	4
154		14	−130.5	+9288	4
155		16	−130.1	+9153	4
156		14	−130.1	+5914	4
157		14	−129.9	+7292	4
158		17	−129.8	−1777	4
159		14	−129.8	−2180	4
160		14	−129.5	+9273	4
161		15	−129.0	−1813	4
162		15	−128.4	+3641	4
163		16	−128.4	+5248	4
164		13	−128.4	+6381	4
165	x˘	11	−128.4	−3498	3
166		14	−128.2	+6270	4
167		16	−127.8	+8602	4
168		15	−127.7	+7757	4
169		15	−127.1	+5713	4
170		15	−126.9	+7198	4
171		15	−126.8	+7138	4
172		16	−126.8	+8856	4
173		14	−126.5	+8049	4
174		16	−126.3	+5210	4
175		15	−125.9	+3751	4
176		13	−125.7	+6981	4
177		15	−125.2	+3676	4
178		13	−125.1	+8683	4
179		14	−124.9	−2042	4
180	e	9	−124.7	+5554	1
181	q	10	−124.6	+4331	1
182		16	−124.5	+9197	4
183		—	−124.5	+4955	4
184		15	−124.3	− 108	4
185		15	−124.2	+7742	4
186		14	−123.7	−2234	4
187		16	−123.3	+4184	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.	No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.	No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
188		—	−123.1	−3698	4	259		16	−101.7	−1940	4	327		15	− 79.8	+5413	4
189		15	−122.8	−2481	4	260		16	−101.5	+5983	4	328		16	− 79.7	+3694	4
190	ρ˘	12	−122.1	+6693	1	261	π˘	9	−101.4	+6757	1	329		14	− 79.5	+6090	4
191		15	−121.7	+4116	4	262		14	−101.4	−1446	4	330		14	− 78.3	−2814	4
192		16	−121.5	+9776	4	263		15	−101.2	+ 484	4	331		12	− 78.2	+7831	4
193		16	−121.5	+7809	4	264		16	−101.0	+3623	4	332		11	− 78.0	−2033	4
194		14	−121.2	+6000	4	265		16	−100.9	+5914	4	333		16	− 77.8	−1205	4
195		12	−120.6	+8327	4	266		14	−100.8	+4433	4	334		15	− 77.7	−3204	4
196		16	−120.6	+4203	4	267		12	−100.6	+3995	4	335		12	− 77.6	+7163	4
197		16	−120.6	+7882	4	268		16	−100.5	+8483	4	336		17	− 77.2	+2971	4
198		16	−120.5	+4471	4	269		16	−100.2	+1421	4	337	N	10	− 76.5	+1828	1
199		16	−120.4	+4406	4	270		15	− 99.8	+4900	4	338		16	− 76.4	+5542	4
200	g˘	9	−120.2	−5120	1	271		15	− 99.6	+5058	4	339		15	− 76.4	−3154	4
201		16	−120.2	+4356	4	272		14	− 99.4	+4065	4	340		17	− 76.3	− 115	4
202		14	−119.9	−3858	4	273		13	− 98.9	+7790	4	341		14	− 76.3	+7027	4
203		16	−119.9	+9761	4	274		16	− 98.9	+8448	4	342		16	− 76.0	−1167	4
204		16	−119.6	+3575	4	275		13	− 98.8	+1483	4	343	n	10	− 75.5	+3016	1
205		11	−119.5	+2740	4	276		11	− 98.4	+7954	4	344	γ˘	8	− 75.5	+9843	1
206		15	−118.8	+4141	4	277		15	− 98.2	+6757	4	345		16	− 74.7	+9000	4
207		16	−118.2	+3765	4	278		16	− 96.4	+8925	4	346		14	− 74.7	−1833	4
208		15	−117.6	+4211	4	279		14	− 96.1	+4552	4	347		14	− 74.6	+8280	4
209		16	−117.5	+4689	4	280		14	− 95.9	+6871	4	348		15	− 74.6	+6739	4
210		14	−117.3	+8475	4	281		12	− 95.3	+2948	4	349		17	− 74.5	−2143	4
211		12	−117.1	+2952	4	282	M	11	− 95.1	− 880	1	350		17	− 74.5	+3352	4
212		12	−117.1	+4835	4	283		16	− 95.1	−2087	4	351		14	− 73.9	−2739	4
213		16	−117.0	+7697	4	284		15	− 94.8	−4477	4	352		17	− 73.8	− 30	4
214	η˘	13	−117.0	+8670	1	285		14	− 94.6	+7909	4	353		13	− 73.7	+6824	4
215			−116.6	−3988	4	286		16	− 94.6	+5337	4	354	Z‴	12	− 73.4	+6252	4
216		16	−116.3	+3403	4					neb					dou-	ble	
217		15	−116.3	+ 353	4	287		15	− 94.1	+1195	4	355		15	− 72.9	+5873	4
218		10	−116.2	+5932	4	288		16	− 94.0	+4241	4	356		16	− 72.8	+8935	4
219		13	−116.1	+2690	4	289		16	− 93.5	−1340	4	357		16	− 72.8	−2118	4
220		14	−116.0	+6841	4	290		16	− 93.4	+5302	4	358		13	− 72.2	+ 659	4
221		16	−115.6	+4624	4					neb		359		15	− 72.0	+3851	4
222		14	−115.4	+8292	4	291	ω	7	− 93.0	+9715	1	360		14	− 72.0	−1723	4
223		15	−114.0	+7485	4	292	c	10	− 92.4	+6215	1	361	Z‴	11	− 72.0	+6209	4
224		15	−113.3	+6775	4	293	x	11	− 91.7	−2874	1				dou-	ble	
225	μ˘	14	−112.8	+9876	3	294		16	− 91.0	−1788	4	362		15	− 71.9	+2381	4
226		15	−112.1	+7927	4	295		16	− 90.6	+6120	4	363		12	− 71.9	+7601	4
227	ε˘	13	−111.3	+9253	3	296		15	− 90.3	+6781	4	364		15	− 71.9	+5796	4
228		15	−110.8	+7560	4	297		12	− 90.3	+8008	4	365		12	− 71.7	+6957	4
229		16	−110.6	+9353	4	298		15	− 89.8	+ 719	4	366		15	− 71.5	+8850	4
230		15	−110.2	+6821	4	299	(ρ)	11	− 89.5	−1456	1	367		16	− 71.5	− 972	4
231		14	−110.0	+8472	4	300	π	7	− 89.4	+9469	1	368		14	− 71.4	+5175	4
232		16	−109.4	+2930	4	301		14	− 89.2	+7006	4	369		14	− 71.2	+6405	4
233		15	−109.4	+8557	4	302		15	− 88.7	+2403	4	370	t	11	− 71.2	+4079	1
234	d	10	−109.1	+5295	1	303		12	− 88.6	+5601	4				dou-	ble	
235		15	−108.8	+8597	4	304		14	− 88.1	− 443	4	371			− 70.8	+6479	4
236	S	8	−108.7	+ 859	1	305		15	− 88.0	+4742	4	372		13	− 70.7	+7276	4
237		13	−108.5	+8245	4	306		15	− 87.9	+6800	4	373	(a)	11	− 70.6	+5699	4
238	S′	15	−108.4	+ 904	4	307		16	− 87.6	+4558	4	374		16	− 70.4	+2331	4
239		14	−108.1	+8988	4	308		16	− 86.5	+3961	4	375		16	− 70.2	−2023	4
240		15	−107.9	+8776	4	309	ζ˘	11	− 86.1	+8761	1	376		13	− 70.2	−2108	4
241	w˘	13	−107.4	−2395	3	310		15	− 85.9	+6991	4	377		13	− 70.0	−1883	4
242		13	−106.5	+8000	4	311		15	− 85.4	−1553	4	378		12	− 69.9	+5030	4
243		16	−106.4	+8484	4	312		13	− 85.3	+5699	4	379		13	− 69.9	+5297	4
244		16	−105.1	+3441	4	313		14	− 85.2	−2854	4	380		16	− 69.5	+5861	4
245		16	−104.9	−2215	4	314		13	− 85.0	+6058	4	381	t′	12	− 69.2	+4067	4
246		16	−104.5	+7815	4	315		16	− 84.4	+9285	4	382		11	− 69.0	−2013	4
247		12	−104.4	+6632	4	316		15	− 84.2	+1450	4	383		14	− 69.0	−1923	4
248		16	−104.4	+5077	4	317		—	− 83.5	+ 906	4	384		15	− 68.7	+8215	4
249		16	−104.3	−2987	4	318		17	− 83.2	−1269	4	385		13	− 68.5	−1573	4
250	T	10	−104.1	+2548	1	319		15	− 83.0	− 530	4	386		16	− 68.5	+6410	4
251		16	−104.0	+5978	4	320		14	− 82.6	+5341	4	387	Z	6	− 67.9	+6499	1
252	φ	8	−103.5	+7760	1	321		13	− 82.2	+3549	4	388		13	− 67.7	−2063	4
253		16	−103.3	−1241	4	322	(v) {	13	− 81.0	−1290	1	389		14	− 67.7	+5114	4
254		16	−103.0	+2809	4	323	(v) {	13	− 81.0	−1302	1	390		14	− 67.6	−1748	4
255		15	−103.0	+1945	4				dou-	ble		391		16	− 67.5	+5912	4
256		16	−102.4	−2098	4	324		15	− 80.9	+4610	4	392		13	− 67.4	+7750	4
257		14	−102.2	+4547	4	325		15	− 80.7	+6065	4	393		13	− 67.3	−4067	4
258		16	−101.9	+ 299	4	326		17	− 80.1	− 670	4	394		16	− 67.1	+2109	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
395		14	— 66.5	—2049	4
396		14	— 66.6	—1813	4
397	[L]	14	— 66.0	— 445	2
398	b˘	8	— 66.0	+9609	1
399		14	— 65.8	+6327	4
400		16	— 65.8	+1679	4
401		12	— 65.6	+7444	4
402		13	— 65.6	—1813	4
403	o		— 65.5	—2023	1
		7	dou-	ble	
404			— 65.3	—2014	2
405		15	— 65.2	—2348	4
406		11	— 65.2	—3817	4
			doubt-	ful star	
407		10	— 64.2	+6130	4
408		14	— 64.1	—1973	4
409		14	— 64.0	—1878	4
410		14	— 63.9	—2098	4
411		14	— 63.8	+ 292	4
412		14	— 63.4	+7270	4
413		15	— 63.4	+6434	4
414	ν˘	11	— 63.2	+7730	1
415		12	— 63.1	—2148	4
416		14	— 63.0	—1395	4
417		15	— 63.0	+2204	4
418		14	— 62.6	—2285	4
419		13	— 62.6	—1905	4
420		14	— 62.5	—1990	4
421		15	— 62.4	+6618	4
422		13	— 62.1	—1285	4
423		15	— 62.1	+8091	4
424		15	— 61.5	+6414	4
425		15	— 61.4	+6573	4
426	P	9	— 61.2	+2854	1
			dou-	ble	
427		15	— 61.0	— 150	4
428		14	— 61.0	—2410	4
429		11	— 60.8	+6032	4
430	P′	15	— 60.6	+2898	4
431	y	11	— 60.6	—2834	1
432		13	— 60.4	+5707	4
433		11	— 60.3	+6260	4
434	Z″	9	— 60.0	+6014	1
			dou-	ble	
435	Z′	9	— 59.9	+6227	1
436		16	— 59.9	+2764	4
437		15	— 59.8	+8668	4
438		15	— 59.2	—1407	4
439		14	— 58.5	+2334	4
440		13	— 58.0	—1416	4
441	c˘	8	— 57.8	+9528	1
442		14	— 57.7	—1803	4
443		16	— 57.5	+2844	4
444		15	— 57.2	—1156	4
445		12	— 57.1	+4796	4
446		16	— 56.9	+1764	4
447		15	— 56.9	+7439	4
448		14	— 56.6	+8701	4
449		16	— 56.5	+3170	4
450		15	— 55.8	— 865	4
451		15	— 55.8	+7359	4
452	K′	8	— 55.7	—1612	1
			tri-	ple	
453		15	— 54.7	— 565	4
454	(σ)	10	— 54.5	+4648	1
455	K²	9	— 54.3	—1591	2
			dou-	ble	
456		14	— 54.1	+8211	4
457		16	— 54.1	+1695	4
458	K²	9	— 54.0	—1600	1
			dou-	ble	

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
459		11	— 53.7	—3863	4
			doubt-	ful	
460		16	— 53.6	+3106	4
461		15	— 53.4	+ 28	4
462		16	— 53.4	+7459	4
463		13	— 53.3	—2670	4
464		13	— 53.3	+8689	4
465		15	— 53.0	+7309	4
466		16	— 52.7	+1855	4
467		13	— 52.4	+4900	4
468	C	8	— 51.6	+ 539	1
			dou-	ble	
469		16	— 51.4	+6360	4
470		15	— 51.2	+1761	4
471		16	— 51.2	+4328	4
472		17	— 51.0	—1860	4
473		17	— 50.9	+2546	4
474		16	— 50.7	+7398	4
475		12	— 50.5	+2906	4
476	(p)	10	— 50.2	+3627	1
			dou-	ble	
477		16	— 50.0	—1770	4
478	(π)	9	— 49.8	+5569	1
479		12	— 49.8	+5476	4
480		14	— 49.7	+6894	4
481		14	— 49.6	+ 539	4
482		15	— 49.6	+ 509	4
483		16	— 49.1	+8090	4
484		14	— 49.0	+1705	4
485		14	— 48.9	+8352	4
486	(p)′	17	— 48.9	+3657	4
487		15	— 48.9	+ 481	4
488		14	— 48.6	+8297	4
489		14	— 48.6	—1705	4
490	C′	12	— 48.4	+ 655	4
491		16	— 48.0	+7987	4
492		13	— 47.4	+5096	4
493		16	— 47.4	—2952	4
494		17	— 47.3	+5596	4
495		16	— 46.9	+6278	4
496		11	— 46.8	+6713	4
497	d	11	— 46.2	+4743	1
498		15	— 45.7	+ 408	4
499		13	— 45.7	—3914	4
500		13	— 45.1	+5825	4
501		13	— 45.0	+2718	4
502	ψ˘	11	— 44.7	+6988	1
503		17	— 44.6	+3725	4
504		16	— 44.3	+8151	4
505		17	— 43.8	+3825	4
506		15	— 43.4	—2706	4
507		16	— 42.9	+6327	4
508		15	— 42.8	—2575	4
509		17	— 42.6	+3735	4
510		17	— 42.5	+3670	4
511	o˘	11	— 42.4	+8367	3
512		15	— 42.4	—2490	4
513		16	— 41.2	—1780	4
514		15	— 41.0	—3049	4
515	[o]	13	— 40.3	— 370	2
516		13	— 40.3	—3503	4
517		12 :	— 40.1	—1920	4
518		16	— 39.4	+ 802	4
519	u˘	11	— 39.3	—3583	3
520		15	— 38.9	+1331	4
521		16	— 38.9	—1810	4
522	U	7	— 38.5	+4627	1
523		14	— 38.3	—1469	4
524	t˘	13	— 38.3	—2585	3
525		16	— 37.9	+ 806	4
526		13	— 37.4	—3126	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
527		14	— 37.3	—3013	4
528		17	— 36.8	+4187	4
529		13 :	— 36.1	—1755	4
530		14	— 35.9	+1230	4
531	H	11	— 35.9	0	1
532		14	— 35.6	—3140	4
533		12	— 35.4	—4862	4
534		15	— 35.1	—1124	4
535	ω˘	10	— 34.7	+7904	1
536	[p]	15	— 34.7	— 137	2
537		17	— 34.4	+5695	4
538		15	— 34.3	+1786	4
539		16	— 34.3	+ 675	4
540	Q	9	— 34.2	+3003	1
541		16	— 34.1	—1890	4
542		16	— 33.9	+ 680	4
543		14	— 33.8	+ 358	4
544		13	— 33.7	—2571	4
545		13	— 33.6	+1042	4
546		15	— 33.6	+1812	4
547	(ξ)	12	— 33.5	—2155	1
548	[q]	13	— 33.5	— 577	2
549		17	— 33.4	+5440	4
550		15	— 33.1	+6930	4
551		16	— 32.9	+3495	4
552		14	— 32.8	+7303	4
553	B	11	— 32.6	— 884	1
554		15	— 32.5	—1255	4
555		12	— 32.3	+7318	4
556		13	— 32.2	—3706	4
557		15	— 32.1	+1711	4
558	(q)	9	— 31.8	+4058	1
559		13	— 31.6	+6172	4
560		13	— 31.4	+ 160	
561		15	— 31.4	—4872	4
562		14	— 31.3	+ 782	4
563		13	— 31.2	+2785	4
564			— 31.1	+1492	4
565		16	— 30.9	—4545	4
566	[r]	13	— 30.7	— 147	2
567		16	— 30.7	+3459	4
568		14	— 30.6	—1835	4
569		17	— 29.9	+5674	4
570		17	— 29.6	+4071	4
571	D′	8	— 29.1	+ 860	2
572		16	— 29.0	—4882	4
573		13	— 29.0	+2964	4
574		16	— 29.0	+6782	4
575	D	8	— 28.8	+ 798	1
			dou-	ble	
576	[s]	15	— 28.5	— 710	2
577		14	— 28.3	+7177	4
578		16	— 27.8	+3705	4
579		16	— 27.5	—4272	4
580		16	— 27.1	—4242	4
581		12	— 27.0	—4118	4
582		15	— 26.5	+1749	4
583		12	— 26.5	+4724	4
584	(ν)	11	— 26.4	—2001	1
585		12	— 26.2	+2198	4
586		14	— 26.2	— 209	4
587		16	— 26.1	+7725	4
588		14	— 26.1	+5911	4
589		15	— 25.8	+ 415	4
590		16	— 25.8	+6811	4
591		17	— 25.7	+5711	4
592		16	— 25.5	—1810	4
593	ρ	8	— 25.2	+6093	1
594		13	— 25.2	+1613	4
595	(τ)	10	— 25.0	+3331	1
596		17	— 24.3	+3634	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
597		11	− 24.1	+5044	4
			dou-	ble	
598		15	− 24.0	+ 675	4
599		11	− 24.0	+1835	4
600		12	− 23.5	−4548	4
601		11	− 23.5	+4990	4
			dou-	ble	
602		12	− 23.5	−4832	4
603		16	− 23.3	+ 700	4
604		15	− 23.1	−1920	4
605		15	- 23.0	−1820	4
606		14	− 23.0	+6168	4
607	[t]	12	− 22.6	+ 130	2
608		13	− 22.5	+3168	4
609		13	− 22.4	−2015	4
610		12	− 22.2	+7950	4
611		12	− 22.1	−4542	4
612		12	− 21.9	−4730	4
613	(r)	12	− 21.9	+4617	1
614		16	− 21.7	−4654	4
615		11	− 21.3	−4393	4
616		14	− 21.3	− 180	4
617		17	− 21.0	+2119	4
618	γ′	9	− 20.9	−4910	2
			close	double	
619	γ	8	− 20.8	−4882	1
620		15	− 20.8	−5067	4
621	(m)	10	− 20.8	+5596	1
			red		
622	I	9	− 20.7	+1460	1
623		16	− 20.2	+6670	4
624		15	− 20.1	+ 330	3
625		13	− 19.6	−4857	4
626		15	− 19.5	−1922	4
627		14	− 19.3	+ 560	3
628		16	− 19.3	+2849	4
629		11	− 18.8	+5197	4
630	F	8	− 18.7	−1776	1
631		15	− 18.2	+6123	4
632		14	− 18.1	+3237	4
633		16	− 17.9	−1337	4
634	[u]	15	− 17.7	− 85	2
635		15	− 17.5	−2075	4
636		16	− 17.5	+1302	4
637	ε	8	− 17.3	−4042	1
			red		
638		15	− 16.8	+2808	4
639		16	− 16.7	+2955	4
640	(k)	10	− 16.7	+3403	1
641		14	− 16.3	+8191	4
642		14	− 15.8	+6787	4
643		13	− 15.7	−4716	4
644	(δ)	10	− 15.5	+ 705	1
645		14	− 15.3	+3329	4
646		14	− 15.1	−1995	4
647		15	− 15.0	−3035	4
648		16	− 14.8	−4512	4
649		15	− 14.7	+8211	4
650		17	− 14.6	−1043	4
651		12	− 14.3	+3622	4
652	(s)	10	− 14.2	+4234	1
653		16	− 14.1	−4467	4
654		15	− 13.7	+4142	4
655		16	− 13.1	−1591	4
656		15	− 13.0	−3090	4
657		11	− 12.5	−3394	4
658		16	− 12.5	+ 815	4
659		17	− 12.5	+1470	4
660		14	− 12.2	+ 425	4
661		15	− 12.2	−4558	4
662		—	− 11.8	+3354	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
663	(μ)	11	− 10.8	−1884	1
664	[v]	12	− 10.7	+ 106	2
665		12	− 10.6	+8847	4
666		17	− 10.2	− 555	4
667		14	− 9.8	+3779	4
668		12	− 9.6	+2766	4
669		15	− 9.4	−3886	4
670	[w]	13	− 9.3	− 830	2
671		15	− 9.3	−3040	4
672		11	− 9.2	+8548	4
673		11	− 9.2	+3741	4
674		15	− 8.7	−2252	4
675		15	− 8.7	−3706	4
676		15	− 8.5	−4152	4
677	κ̆	12	− 8.3	−3185	3
678		12	− 8.2	−2510	4
679		16	− 8.1	+1075	4
680		12	− 8.0	+8593	4
681		15	− 7.9	+1313	4
682		14	− 7.9	+7343	4
683		—	− 7.5	−3531	4
684	(λ)	12	− 7.5	−1973	1
685	f̆	12	− 7.5	+9224	3
686		14	− 7.2	+ 355	4
687		14	− 7.0	+2490	4
688		13	− 6.9	+2803	4
689		16	− 6.8	+1060	4
690		13	− 6.7	−1506	4
691		15	− 6.4	−2242	4
692		13	− 5.6	+2952	4
693	R	9	− 5.3	+3744	1
			red		
694		16	− 4.9	+2831	4
695		13	− 4.5	−1065	4
696	φ̆	11	− 4.5	+6684	1
697		14	− 4.4	−4561	4
698		13	− 4.2	+3321	4
699		14	− 4.0	+2237	4
700		14	− 4.0	−1580	4
701		15	− 3.2	−4215	4
702		16	− 3.0	−3144	4
703		15	− 3.0	+9002	4
704		14	− 2.8	+ 555	4
705		15	− 2.8	−3184	4
706		14	− 2.6	+ 670	4
707		12	− 2.3	+1996	4
708		13	− 2.2	+ 200	4
709		14	− 2.1	+8748	4
710		16	− 1.9	−3164	4
711		13	− 1.9	+9154	4
712		15	− 1.8	−4520	4
713	[c]	11	− 1.6	+5005	3
714		14	− 1.4	+4402	4
715		15	− 1.2	+2142	4
716		14	− 1.1	−2943	4
717	[x]	14	− 0.6	− 190	2
718		16	− 0.4	−4550	4
719		13	− 0.3	+8808	4
720		16	− 0.1	−2001	4
721		15	− 0.1	−1839	4
722		13	− 0.1	+1852	4
723	A	1	0	0	1
724		12	+ 0.1	−2320	4
725		15	+ 0.2	+7736	4
726		15	+ 0.6	−1886	4
727		17	+ 0.6	− 601	4
728		13	+ 1.0	− 49	2
729		15	+ 1.0	+2207	4
730		12	+ 1.1	− 34	2
731		14	+ 1.2	+8858	4
732		13	+ 1.3	+2971	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
733		13	+ 1.9	+3372	4
734		12	+ 2.0	+2559	4
735		15	+ 2.2	+ 771	4
736	(α)	9	+ 2.4	− 233	1
737		14	+ 2.6	+ 330	4
738		13	+ 2.7	+ 825	4
739	E	11	+ 2.7	+1056	1
740	[y]	13	+ 2.8	+ 207	2
741	(γ)	11	+ 2.9	+ 507	1
742		13	+ 3.6	−3780	4
743	(β)	11′	+ 5.2	− 57	1
744		12	+ 5.6	+1271	4
745		15	+ 5.6	+3980	4
746		15	+ 5.7	+2028	4
747		14	+ 5.9	+3031	4
748		14	+ 6.2	+4451	4
749		16	+ 6.2	− 180	4
750		12	+ 6.3	−2852	4
751		15	+ 6.6	+ 963	4
752		15	+ 6.9	+3663	4
753		15	+ 7.0	+ 300	4
754		14	+ 7.4	+ 440	4
755		14	+ 7.7	+4802	4
756		13	+ 8.1	+ 90	4
757		14	+ 8.8	−3819	4
758	(θ)	10	+ 9.0	+ 983	1
759		12	+ 9.1	−2860	4
760		15	+ 9.5	− 226	4
761	(η)	10	+ 9.5	+ 907	1
762	(ζ)	10	+ 9.7	+ 811	1
763		14	+ 9.8	+2030	4
764		14	+ 10.1	+ 607	4
765		14	+ 10.1	+4433	4
766		16	+ 10.5	+1052	4
767		15	+ 10.5	−3699	4
768		14	+ 10.5	+3251	4
769		14	+ 10.6	+ 300	4
770	(Ψ)	11	+ 10.8	+4224	1
771		14	+ 11.0	+1238	4
772		14	+ 11.2	−4029	4
773		14	+ 11.2	+3246	4
774		14	+ 11.9	+ 570	4
775		14	+ 11.9	+2913	4
776		13	+ 12.1	+1798	4
777		15	+ 12.6	− 290	4
778		11	+ 12.7	+4948	4
779	(ε)	10	+ 13.0	+ 623	1
780		15	+ 13.0	+3873	4
781		15	+ 13.1	+3202	4
782	k̆	9	+ 13.4	−4277	3
783		14	+ 13.6	+1965	4
784	χ	11	+ 14.0	+3404	1
785		14	+ 14.6	+ 290	4
786	τ̆	10	+ 15.2	+7499	1
787		13	+ 15.3	+1867	4
788		15	+ 15.4	+4353	4
789		14	+ 15.8	−2767	4
790		17	+ 16.5	+ 986	4
791		15	+ 16.6	+1855	4
792	r̆	14	+ 16.7	− 838	2
793		17	+ 16.8	+ 892	4
794	G	11	+ 16.9	+ 433	1
795		15	+ 16.9	+3835	4
796	ξ̆	14	+ 17.5	−2100	2
797		15	+ 17.5	− 210	4
798		14	+ 17.6	+5392	4
799		15	+ 17.9	−3615	4
800		15	+ 18.0	− 214	4
801		17	+ 18.0	+1048	4
802		14	+ 18.4	−1814	4
803	o	11	+ 19.0	+2400	1

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
804		15	+ 19.2	+ 340	4
805		15	+ 19.2	+4366	4
806		17	+ 19.5	+ 946	4
807		13	+ 21.4	+3065	4
808		14	+ 21.4	+5312	4
809		13	+ 21.7	−3140	4
810		17	+ 23.1	− 718	4
811		16	+ 23.8	+ 122	4
812		14	+ 23.8	−3681	4
813	o′	13	+ 24.0	+2665	4
814		14	+ 24.3	+5379	4
815		13	+ 24.8	+5564	4
816		16	+ 25.5	−3951	4
817		16	+ 25.5	+ 55	4
818		15	+ 27.4	+1936	4
819		16	+ 27.6	+ 401	4
820		15	+ 27.8	+3701	4
821		16	+ 28.8	− 60	4
822		15	+ 29.5	+4584	4
823	s	13	+ 29.7	+1520	2
824		12	+ 29.9	+6119	4
825	v	10	+ 30.7	+4077	1
826		15	+ 31.0	+ 687	4
827		14	+ 31.8	−1005	4
828		14	+ 32.0	− 908	4
829		14	+ 32.6	−1851	4
830		16	+ 32.6	+ 350	4
831		14	+ 32.7	+1745	4
832		13	+ 32.7	+4690	4
833		15	+ 32.8	+4187	4
834		13	+ 32.9	+5904	4
835		11	+ 33.3	+6249	4
836		15	+ 33.7	+4299	4
837	ι˘	9	+ 33.9	−4440	1
838		11	+ 33.9	+5909	4
839		15	+ 34.6	− 949	4
840		14	+ 34.9	+6254	4
841		11	+ 37.0	+5859	4
842		14	+ 37.2	+1305	4
843		15	+ 37.3	− 294	4
844	λ	7	+ 37.8	−4143	1
845		16	+ 37.9	+2634	4
846		17	+ 38.6	−2055	4
847		16	+ 38.9	−1952	4
848		13	+ 39.1	+1605	4
849		14	+ 39.2	+2383	4
850		14	+ 39.6	−2645	4
851		15	+ 39.8	−3689	4
852	[n]	14	+ 41.2	+3303	3
853	f	12	+ 41.3	+5799	1
854		12	+ 42.2	+2353	4
855		17	+ 42.2	− 795	4
856		14	+ 42.4	+5794	4
857		15	+ 42.6	+4382	4
858		11	+ 43.3	+6209	4
859		13	+ 43.7	−3997	4
860		14	+ 43.8	+3401	4
861		13	+ 43.8	−2078	4
862	β	8	+ 44.6	−2937	1
			dou-	ble	
863		11	+ 44.7	+5909	4
864		14	+ 45.1	+5889	4
865		—	+ 45.5	−1114	4
866		15	+ 45.6	+4512	4
867	β′	12	+ 45.7	−2978	4
868		14	+ 46.3	−1229	4
869		13	+ 46.8	+4672	4
870		15	+ 47.2	+4551	4
871		12	+ 47.7	+1921	4
872	(χ)	8	+ 49.4	+7585	1
873		14	+ 50.1	+1718	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
874		14	+ 50.1	−1255	4
875		14	+ 50.2	−1237	4
876		14	+ 50.3	−1394	4
877		12	+ 50.4	+6092	4
878		12	+ 50.5	+4778	4
879		11	+ 50.7	+5962	4
880		15	+ 51.0	+4708	4
881		15	+ 51.5	−4622	4
882		16	+ 51.6	+1333	4
883		14	+ 52.0	+1901	4
884		15	+ 52.1	−4143	4
885		12	+ 52.6	+3982	4
886		15	+ 52.6	−1402	4
887		15	+ 52.9	+1333	4
888		14	+ 53.1	−2264	4
889		12	+ 53.6	−4153	4
890		14	+ 54.1	+5374	4
891		15	+ 54.6	−3162	4
892		12	+ 54.7	+6163	4
893		15	+ 54.8	−1530	4
			doubt-	ful	
894		13	+ 55.0	+3917	4
895		14	+ 55.1	+5897	4
896		16	+ 55.2	−3534	4
897		13	+ 56.1	+1239	4
898		13	+ 56.3	+4042	4
899		15	+ 56.6	−3198	4
900		13	+ 56.6	+5374	4
901		15	+ 56.7	+2075	4
902		12	+ 56.8	−4210	4
903		14	+ 56.9	+1346	4
904		16	+ 56.9	−1438	4
			doubt-	ful	
905		16	+ 56.9	− 160	4
906		14	+ 57.0	+5452	4
907		13	+ 57.5	+4245	4
908		15	+ 57.8	−4850	4
909		16	+ 57.8	−4930	4
910		14	+ 57.9	−3860	4
911		16	+ 58.0	−3317	4
912	J	13	+ 58.0	+ 335	2
913		14	+ 58.7	+2270	4
914		14	+ 58.7	−2234	4
915		12	+ 58.8	+2544	4
916		13	+ 59.2	+1564	4
917		13	+ 59.3	+6174	4
918	m	12	+ 59.5	−1799	1
			dou-	ble	
919		17	+ 59.9	−1408	4
			doubt-	ful	
920		12	+ 59.9	+2008	4
921		14	+ 60.2	+3722	4
922		16	+ 60.3	−4880	4
923		16	+ 60.3	+ 36	4
924		14	+ 60.4	+5994	4
925		13	+ 60.5	− 586	4
926	m′	12	+ 60.8	−1877	4
			dou-	ble	
927		13	+ 60.8	+1229	4
928		17	+ 61.0	+3996	4
929	h	10	+ 61.5	+2399	1
930		14	+ 61.5	+4104	4
931		13	+ 61.7	+4409	4
932		15	+ 61.8	−4478	4
933	(z)	12	+ 62.0	+3870	1
934	(t)	10	+ 62.1	+1494	1
935		11	+ 62.2	+5297	4
936		16	+ 63.2	−4518	4
937		16	+ 63.2	+3946	4
938		15	+ 63.5	−2234	4
939		15	+ 63.9	−3930	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
940		13	+ 63.9	−3115	4
941		14	+ 63.9	+6094	4
942		13	+ 64.1	− 655	4
943		14	+ 64.1	+2838	4
944		16	+ 64.2	+3841	4
945		15	+ 64.5	−3630	4
946		16	+ 64.9	− 65	4
947		15	+ 65.2	+1775	4
948		14	+ 65.2	+4888	4
949		15	+ 65.5	+3867	4
950		13	+ 65.7	+1418	4
951		11	+ 65.9	−4601	4
952		14	+ 66.3	−3130	4
953	δ	8	+ 66.7	−5486	1
954		15	+ 67.6	+4778	4
955	n˘	12	+ 67.7	+1274	1
956		16	+ 67.9	− 132	4
957		13	+ 67.9	+4922	4
958		14	+ 68.0	+1470	4
959		11	+ 68.4	−4513	4
960		12	+ 68.8	+5891	4
961		16	+ 69.2	−3370	4
962		12	+ 69.8	−2129	4
963		15	+ 70.3	+4836	4
964	(ω)	10	+ 70.3	+4660	1
965		13	+ 71.1	+5991	4
966		11	+ 71.3	+2175	4
967		12	+ 72.6	− 487	4
968		15	+ 72.7	+1760	4
969		12	+ 73.0	+5298	4
970		11	+ 73.3	−1977	4
971		15	+ 73.3	−3674	4
972		15	+ 73.8	−4465	4
973	[z]	12	+ 74.6	− 371	3
974	β˘	10	+ 75.9	+6053	1
975		17	+ 76.0	−1869	4
976		14	+ 76.4	−3730	4
977		16	+ 76.5	+6089	4
978		12	+ 76.9	+4155	4
979		15	+ 77.3	+3380	4
980		14	+ 77.7	+5373	4
981		14	+ 78.0	+2813	4
982	v	10	+ 78.3	+3041	1
983	*a*	9	+ 78.4	−3590	1
984		14	+ 78.7	+3113	4
985	σ	9	+ 78.9	+5014	1
986		14	+ 79.1	+4238	4
987		15	+ 79.9	+5500	4
988		13	+ 80.2	+ 79	4
989		17	+ 80.8	−2134	4
990		15	+ 81.9	+4974	4
991		16	+ 82.7	−3545	4
992		15	+ 82.9	+5370	4
993		14	+ 83.5	+ 726	4
994	g′	10	+ 83.8	+2020	4
995		16	+ 83.9	−3068	4
996		16	+ 84.1	+6024	4
997		14	+ 84.6	+3331	4
998		13	+ 84.6	+ 833	4
999		15	+ 84.8	−3381	4
1000		16	+ 85.0	−1047	4
1001		13	+ 85.3	+6014	4
1002		15	+ 86.6	+3623	4
1003		13	+ 86.9	+ 412	4
1004	g	10	+ 88.0	+2156	1
1005		16	+ 88.4	+ 32	4
1006		15	+ 88.4	+3017	4
1007		14	+ 88.8	+4472	4
1008	φ	10	+ 89.0	+5745	1
1009	l˘	12	+ 89.0	+ 686	3
1010		13	+ 89.9	+5514	4

No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.	No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.	No.	Letter.	Mag.	ΔRA from η Argus. x Sec. Dec.	ΔNPD from η Argus. y Micro. Pts.	Class.
1011		12	+ 90.0	−2509	4	1079		13	+117.4	+ 496	4	1148		15	+142.9	−1813	4
1012	b	9	+ 90.2	−1040	1	1080		16	+117.5	+5766	4	1149		15	+143.2	+5030	4
1013	a	9	+ 90.5	−2190	1	1081		14	+118.3	+2644	4	1150	(l)	11	+143.4	+ 560	1
			dou-	ble		1082	[e]	11	+118.4	+4353	3	1151		17	+143.5	+2788	4
1014		14	+ 90.5	− 599	4	1083	[g]	12	+118.4	+4987	3	1152		13	+143.5	+ 897	4
1015		14	+ 90.6	+2614	4	1084		15	+118.8	+2446	4	1153		16	+144.2	+5255	4
1016		14	+ 91.3	+4256	4	1085		12	+119.1	+2190	4	1154		13	+144.4	+4891	4
1017		14	+ 91.8	+ 445	4	1086		13	+120.5	+1830	4	1155		15	+144.7	+3789	4
1018	a′	13:	+ 91.8	−2250	4	1087		12	+121.5	−2114	4	1156	(y)	11	+145.2	+1596	1
1019		15	+ 91.9	+2664	4	1088		16	+122.4	+ 187	4	1157		12	+145.6	+4643	4
1020		14	+ 92.1	+3470	4	1089		14	+122.5	+3933	4	1158		16	+146.6	+ 125	4
1021		15	+ 92.2	−1560	4	1090		15	+122.5	− 789	4	1159		13	+147.2	+2462	4
1022		16	+ 93.1	− 908	4	1091	V	9	+123.5	+1551	1	1160		16	+147.3	−2682	4
1023		16	+ 93.4	+1947	4	1092		15	+124.2	+5887	4	1161		15	+147.5	+2938	4
1024		15	+ 94.3	+2458	4	1093		16	+124.4	+ 232	4	1162	(v)	11	+148.3	+5848	3
1025		16	+ 95.0	+1897	4	1094		14	+124.4	−1846	4	1163		14	+148.3	− 590	4
1026		12	+ 95.3	+2496	4	1095		16	+125.3	+1610	4	1164		14	+149.0	− 627	4
1027		15	+ 96.6	+2559	4	1096		14	+125.3	−2565	4	1165		16	+149.1	−3160	4
1028		15	+ 96.7	+ 983	4	1097		13	+126.2	+1381	4	1166		12	+150.0	−1731	4
1029	[d]	13	+ 97.0	− 287	3	1098		16	+126.3	−1986	4	1167		13	+150.1	− 445	4
1030		15	+ 97.2	+5683	4	1099		13	+126.5	− 705	4	1168		12	+150.3	+4619	4
1031		15	+ 97.2	−1754	4	1100		15	+126.6	+5998	4	1169		14	+151.2	+4780	4
1032		13	+ 97.7	+5983	4	1101		16	+127.2	+1343	4	1170		13	+152.5	−1768	4
1033		16	+ 98.0	− 921	4	1102		15	+127.4	−3181	4	1171		16	+152.6	−2987	4
1034		11	+ 98.3	−2753	4	1103	τ	9	+127.8	+6133	1	1172		11	+153.2	+4780	4
1035		12	+ 98.9	+5988	4	1104		15	+128.0	+3898	4	1173		16	+153.3	+2542	4
1036		15	+ 99.4	+2057	4	1105		16	+128.3	+ 809	4	1174		14	+153.3	− 370	4
1037		13	+ 99.8	− 857	4	1106		15	+128.5	+5787	4	1175		15	+153.6	+1970	4
1038		16	+ 99.9	− 418	4	1107		14	+128.5	+2989	4	1176		15	+154.3	− 238	4
1039		15	+100.2	+5626	4	1108		15	+129.0	+ 517	4	1177	κ	8	+155.9	−1726	1
1040		15	+100.3	−1000	4	1109		11	+129.0	−3421	4	1178		13	+157.4	−4628	4
1041		11	+102.1	−3256	4	1110		14	+129.4	−3038	4	1179		16	+157.5	−1132	4
1042		14	+102.1	+2866	4	1111		16	+129.8	−2570	4	1180		11	+157.8	−1733	4
1043		15	+102.5	+ 999	4	1112		11	+130.0	+6173	4	1181		11	+158.1	−1788	4
1044		10	+102.7	−1323	4	1113		16	+130.4	+1708	4	1182		13	+158.3	+ 92	4
1045		13	+102.8	+5593	4	1114		15	+131.1	+5797	4	1183	W	6	+158.3	+2782	1
1046		14	+102.9	−3171	4	1115		14	+131.2	+5366	4	1184		16	+158.8	−1260	4
1047	p˘	11	+103.2	+1172	3	1116		12	+131.5	+6088	4	1185		12	+160.3	+ 32	4
1048		15	+103.2	+2414	4	1117		15	+132.2	+3823	4	1186		13	+161.1	− 814	4
1049		11	+103.3	+2564	4	1118		15	+132.2	+2935	4	1187		13	+162.6	+4493	4
1050		15	+103.4	+3684	4	1119		12	+132.4	+1151	4	1188		12	+162.6	−2558	4
1051		15	+103.5	+3593	4	1120		11	+132.9	+6098	4	1189	[l]	11	+163.0	+4002	3
1052		13	+103.6	−1658	4	1121		16	+133.3	−3208	4	1190		16	+163.2	−1136	4
1053		16	+103.8	+ 957	4	1122		16	+133.4	+ 768	4	1191		15	+164.0	+3118	4
1054	u		+104.6	+3958	1	1123		14	+133.9	− 589	4	1192		12	+170.2	+4032	4
1055		15	+104.7	+2460	4	1124		15	+133.9	+1090	4	1193		13	+170.2	+4142	4
1056	(x)	11	+105.5	+2776	1	1125	[h]	11	+134.4	+4918	3	1194		12	+171.4	+3677	4
1057		13	+105.7	−2762	4	1126	[k]	11	+134.5	+5396	3	1195		14	+171.3	−1898	4
1058		14	+105.8	− 465	4	1127		16	+135.3	+1573	4	1196		15	+172.4	− 526	4
1059	[f]	11	+106.4	+6136	3	1128		11	+136.1	−3018	4	1197	ζ	8	+174.1	− 556	1
1060		14	+107.7	+2519	4	1129		16	+136.2	+1603	4	1198	[m]	11	+174.6	+4663	3
1061		13	+108.1	+5531	4	1130	δ˘	11	+137.7	− 842	3	1199		12	+177.4	+4072	4
1062		13	+108.6	+3494	4	1131		12	+137.8	− 327	4	1200		12	+178.1	−2430	4
1063	q˘	11	+108.9	−1120	3	1132		15	+137.8	+3017	4	1201	a˘		+178.7	+ 986	1
1064	Ψ	9	+109.3	+5866	1	1133		14	+138.2	−2000	4	1202		14	+178.7	−1953	4
1065		13	+110.5	+3269	4	1134		11	+138.3	+4838	4	1203	Y	7	+178.9	+3441	1
1066		13	+110.9	+6045	4	1135		13	+138.7	− 347	4	1204		12	+180.6	−2539	4
1067		14	+110.9	+5634	4	1136		15	+138.8	+5977	4	1205		11	+183.9	−2112	4
1068	ν	11	+111.0	−3402	1	1137	ξ	10	+139.8	−3535	1	1206	η	8	+194.0	−2192	1
1069	(w)	11	+113.0	+ 753	1	1138		15	+140.5	+5037	4	1207	(u)	11	+194.8	+2134	1
1070		12	+113.7	− 623	4	1139		15	+140.6	+4833	4	1208		10	+197.5	−2997	4
1071		13	+114.1	− 818	4	1140		14	+140.7	+3849	4	1209		12	+198.2	−2816	4
1072		13	+114.3	+2395	4	1141		13	+141.4	−1140	4	1210		12	+199.8	−3187	4
1073		15	+115.1	+5786	4	1142		17	+141.6	+2485	4	1211	λ˘		+201.1	+ 846	1
1074		13	+115.3	+ 506	4	1143		15	+142.1	−1041	4	1212		13	+209.2	−2879	4
1075		14	+115.3	+4028	4	1144		15	+142.2	+2960	4	1213	μ	9	+209.2	−1910	1
1076		14	+115.8	+2264	4	1145		14	+142.5	+2786	4	1214		15	+211.9	−3145	4
1077		12	+116.9	+2526	4	1146		14	+142.9	− 967	4	1215	θ	7	+224.2	−3631	1
1078		13	+117.3	−1756	4	1147		15	+142.9	+3138	4	1216	θ'	12	+225.3	−3615	2

REDUCED OBSERVATIONS

OF

NEBULÆ AND CLUSTERS OF STARS,

MADE WITH THE TWENTY FEET REFLECTOR,

IN THE

YEARS 1834, 1835, 1836, 1837, AND 1838,

AT FELDHAUSEN,

ARRANGED AS A CATALOGUE, IN ORDER OF RIGHT ASCENSION,

FOR

THE EPOCH 1830.

Reduced Observations of Nebulæ and Clusters of Stars made with the 20 feet Reflector, in the years 1834, 1835, 1836, 1837, and 1838, at Feldhausen.

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2308	III. 461	0 1 15.4	115 55 0	F; v L; v m E; v g b M; 4′ l; 1′ br.	733
2309	....	0 1 25.3	147 58 11	F; R; 30″.	735
		25.8	58 21	e F; S; R.	504
2310	....	0 1 54.2	147 56 26	e F; preceding of 2. Requires attention, but no doubt remains.	504
2311	....	0 2 7.2	147 56 56	e e F; the following of 2. Requires attention, but leaves no doubt	504
		9.5	55 51	e e F; S; R	735
2312	....	0 2 51.3	147 53 47	e F; S; R.	735
2313	....	0 5 16.2	114 7 16	e F; L; R (by diagram); v g v l b M; attached to and nearly involving a L star; the following of 2. A very F object of singular appearance, 3 or 4′ diam.; forms a kind of cometic appendage to the star, which, however, is quite at the edge.	641
2314	....	0 6 23.8	151 16 15	e F; R; v l b M; 30″.	734
2315	Δ. 507	0 6 26.4	130 9 58	B; v L; v m E in a long irregular train, the preceding end being much the brightest. Whole length = 1½ diam. of field, or 22′. The nucleus is either a double star or a much more sharply terminated nebulous mass, elongated in a different position (146°.5) from that of the nebula (109°.8).	488
		28.3	9 41	v B; v L; v m E; at least 25′ l and 3′ br. The following part is Faint, the preceding and shorter trinuclear the 2d. nucleus taken. A strange object.	638
		34.2	9 5	v B; v L; a very long irregular crooked ray with 3 nuclei, the second of which appears to consist of stars. See Plate IV. fig. 8.	737
2316	....	0 12 49.4	139 34 35	e F; S; R. The first of a group of 4 nebulæ	497
		49.6	34 50	e F; v S; R; g b M. 1st of 4.	496
2317	....	0 12 59.2	139 35 8	e F; v S; R. The 2nd of a group of 4; in centre of gravity of the triangle formed by the other three.	497
		59.2	35 20	e F; v S; R; 2nd of 4, in centre of gravity of the others.	496
2318	....	0 13 0.4	139 36 35	v F; S; R. The 3rd of a group of 4	497
		1.6	36 40	v F; S; R; g b M. The 3rd of 4	496
2319	....	0 13 7.9	139 34 15	F; S; R. The last of a group of 4	497
		8.1	34 30	F; R; g b M; 20″. The last of 4	496
2320	....	0 14 26.6	136 13 13	v F; R; b M; 40″; r.	490
2321	....	0 15 25.1	123 28 44	v F; R or v l E; g b M; 15″	635
		26.7	30 0	p B; p L; l E; 45″; precedes a star 14 m.	493
2322	Δ. 18 B. 38	0 16 24.4	163 1 58	⊕ 47 Toucani. A most magnificent globular cluster. It fills the field with its outskirts, but within its more compressed part, I can insulate a tolerably defined circular space of 90″ diameter wherein the compression is much more decided and the stars seem to run together; and this part I think has a pale pinkish or rose-colour.	745
		25.9 :	1 51	The great cluster preceding the Nubecula Minor. Estimated diameter of the denser portion 5′; of the whole (not, however, including loose stragglers) 8′. Stars 14....16 m and one = 12 m, n p the centre. Excessively compressed. (N. B. In a sweep below the pole, when of course owing to the low altitude much of the light was lost.)	441
		26.5	1 15	47 *Toucani*. A most glorious globular cluster. The stars are =, 14 m, immensely numerous and compressed. Its last outliers extend to a distance of $2^m\ 16^s$ in R A from the centre. It is compressed to a blaze of light at the centre, the diameter of the more compressed part being 30^s in R A. It is at first v g, then p s v m b M. It is *completely insulated*. After it has passed, the ground of the sky is perfectly black throughout the whole breadth of the sweep. There is a double ⁎ 11 m preceding the centre (Pos. 226°.5—Δ R A = $6^s.5$ from centre of neb).	482
		26.5	1 10	Fills the field with its stragglers, condensation in three distinct stages, first v g, next p s, and finally v s v m b M up to a central blaze whose diameter in R A is $13^s.5$ and whose colour is ruddy or orange-yellow, which contrasts evidently with the white light of the rest. The stars all nearly equal (12 . . . 14 m). A stupendous object. See Plate III. fig. 1.	625

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2323	....	0 18 19.7	124 37 43	e F; S; has a small faint double ✱ n p, 2′ dist.	635
		23.5	37 0	F; L; v l E; 60″; has a double ✱ 2′½ dist. n p......................	493
2324	....	0 18 50.5	147 55 26	p B; R; p s b M; 25″	504
		52.1	55 18	p B; v S; R; g m b M; 15″..	735
2325	....	0 19 4.5	162 28 23	p B; l E; v g b M; 40″..	625
2326	....	0 21 12.8	124 11 52	v F; the preceding of two. The other v L and B.	635
		13.5	12 11	p B; p L; p m E; v g b M.	493
2327	Δ 590?	0 21 57.8	124 11 42	B; L; v m E; p s l b M; 4′ l; 1′ br; pos = 227°; the f of 2	635
		58.9	11 47	v B; v L; v m E; p s m b M; 8′ l; 1′ br; pos = 47°.9; dies away gradually at both extremities; has a star 10 m, dist 45″, pos = 327°.9. See Plate VI. fig. 19.	493
2328	h. 27	0 23 6.7	96 5 19	v F; v l E; g l b M; 60″ l..	739
2329	....	0 24 52.2	122 43 13	v B; S; l E in parallel; s m b M to a ✱ 11 m .... [Obs. makes R A 25 m but as this and the neb of 620, are certainly identical, the earlier minute is preferred.]	494
		53.2	43 55	p B; S; E in parallel; v s b M almost to a star	620
2330	II. 478 h. 30	0 25 26.7	100 38 24	p F; R; g b M; 60″	740
2331	....	0 23 48.3	164 3 8	v F; L; R; v g l b M; 2′..	625
2332	....	0 26 37.2	146 43 46	v F; S; R; 15″; precedes 3 stars..	504
		39.6	42 53	v F; R; g l b M; 20″..	735
2333	....	0 28 30.0	120 24 31	v F; R; 25″; near one or two stars	620
		34.9	24 53	v F; S; R..	495
		35.2	23 58	F; S; l E among several B. stars	494
2334	III. 223?	0 28 50.5	110 52 6	p B; p L; E; g b M; r; 80″ l, 50″ br. If this nebula be really III. 223, the P D assigned to that nebula by my Father's Observations must be 1° in error. The error cannot lie in this observation, the 109th degree of Polar distance being beyond the possible reach of the instrument in sweep 641	641
2335	....	0 29 7.3	164 6 28	e F; R; near a ✱ 8 m. (At the beginning of the Nubecula Minor)......	482
		8.9	6 23	e F; S; l E; r..	625
....	....	0 30 ..	164 27 ..	Here comes on the preceding edge of the Nubecula Minor, seen as a mere nebula—the sweep being below the pole and vision imperfect	441
2336	....	0 32 23.8	147 6 6	v F; S; R; 15″ the preceding of two	504
		30.3::	6 13	e F; S. (Owing to some unknown cause of unsteadiness the Right Ascensions of this sweep are liable to an error which may amount to several seconds of time).	735
2337	....	0 33 0.8	147 8 26	p F; S; R; 20″; the following of two	504
		5.3::	8 18	F; R; v g b M; among stars. (See the above remark respecting R A) ..	735
2338	....	0 33 51.1	164 18 30	F; v g b M; irreg figure	482
		51.2	20 54:	F; R; the field is full of the nebulous light of the Nubecula Minor	745
		53.1	19 58	The first of an irregular string of nebulæ and stars which descends at an angle of about 45° from the centre to the edge of the field (i. e. in a n f direction).	625
2339	....	0 33 55.3	164 23 56	v F; R; outlying	441
2340	Δ. 2	0 34 40.7	164 17 10	An irregular train of stars and nebulosity in the Nubecula Minor. (Evidently that referred to in ∫ 625.	482
2341	....	0 35 29.2	141 6 36	e F; p L; R; g v l b M; 50″	497
2342	....	0 37 5.1	164 31 32	a v F, R nebula or group. (We are now fairly in the Nubecula Minor, and the field begins to be full of a faint perfectly irresolvable nebulous light).	482
2343	....	0 37 7.2	164 22 22	A binuclear nebula, or two, v S, R, running together	625
		9.9	22 18	A small irresolvable knot in the bright part of Nubec. Min..............	738
		13.7:	21 50	p L; v F; R; v g b M; (in a sweep below the pole and ill seen) the R A is probably also in error.	441
2344	....	0 39 3.7::	164 18 9	v F. (Below the pole, and the sweep otherwise irregular. R A's not good)	441
		8.7	18 47	F; E or binuclear; S; v g l b M	625

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2345	V. 1 h. 61	0 39 3.9	116 13 57	v v B; v v L; v m E; 30′ l, 3′ or 4′ br; has several stars in it; g m b M to a centre elongated like the nebula itself. The neb. is somewhat streaky and knotty in its constitution and may perhaps be resolvable.	646
		11.6	13 45	v v B; v v v L; a superb object; $3\frac{1}{3}$ radii of field in length (24′); breadth about 3′; posn = 143°.8 very exact. Its light is somewhat streaky, but I see no stars in it but 4 large and 1 very small one, and these seem not to belong to it, there being many near.—The difference of R Ascensions of this and the former obs. arises in great part from the undefined nature of the object. I prefer this however.	733
2346	Δ 19? or Δ 21?	0 39 9.5	164 1 8	p B; p L; oval; r; 2′ diameter	738
		10.0	0 38	F; R 30″	745
		11.1	0 52	F; L; R; v g b M; 2′. Here begins a starry region of the Nubecula Minor	625
2347	....	0 39 11.1	122 21 17	v B; S; p m E; s m b M; has a ∗ 9 m 5′ dist n f	495
		13.9	21 31	B; p S; l E; v s v m b M; has a ∗ 7′ m 5′ dist n f	620
		14.2	21 13	v B; R; g m b M; 40″. has a ∗ 8 m dist 5′	494
2348	....	0 39 33.5	164 26 33	F; S; R; g b M; 40″ South of a ∗ 8 m. (In Nubec. Minor)	482
		34.6	25 45	Not v F; S; R; has a star 9 m n f.	441
		39.5	26 18	F; l E; 30″; precedes a star 9 m	738
		42.7	26 43	F; S; R; 18″; a star 9 m n f	745
2349	Δ 3?	0 40 13.0	164 2 8	p B; R; 60″ has a star 13 m in centre. Occurs in a field illuminated by the Nubecula Minor and many stars.	738
	Δ 4? or	13.4	1 48	p F; R; 90″	745
	Δ 21?	23.6	1 37	v F; R; g b M; 2′; r. There has probably been an error of 10ˢ committed in reading the chronometer. Reduction re-examined and found correct.	625
2350	....	0 40 15.4	129 10 12	F; S; R; v s v m b M to a ∗ 13 m. A trapezium of L. st. follows	448
2351	....	0 40 53.6	164 24 7	v F; situated on the edge of the Nubecula Minor	441
		56.7	25 53	F	482
		59.2	24 28	v F; R; 30″	738
		62.0	25 13:	F; S; R; 40″	745
2352	....	0 41 43.9	164 12 28	A F, p L, cluster of v S stars. It is the preceding knot (or centre of condensation) of the resolvable portion of the Nubecula Minor which fills the subsequent field and consists of irregularly clustered stars 12....20 m.	738
2353	....	0 42 15.7	164 27 52	v F; S; R; 30″	745
2354	VI. 20 h. 74	0 44 22.5	117 30 33	⊕; B; L; R; g b M; all resolved into stars 12 . . . 16 m; 5′ diam. N.B. This observation decides the doubt raised in the obs. of sweep 292 (see Catal. of Nebulæ, &c. h, No. 74) respecting the Right Ascension of this object in favour of the latter of the two results there set down, which is consequently to be adopted as the correct result of that observation.	643
2355	....	0 44 29.4	122 8 4	v B; L; m E; s b M; has a ∗ 11 m n p	495
		29.9	7 34	B; L; R; g l b M; 90″	620
		32.3	7 28	v B; L; p m E, oval; has a ∗ 11 m n p	494
2356	....	0 44 55.3	164 13 22	Hereabouts seems to be placed the main body of the Nubecula Minor which is a Faint, Rich, Large Cluster of very small stars (12 .... 18) filling many fields, and broken up into many knots, groups, and straggling branches. But the whole is clearly resolved into stars.	625
		46 3.7	19 23	I should consider this to be about the main body of the Nubecula Minor, which is here fairly resolved into excessively minute stars, which are however certainly *seen* with the left eye.	482
2357	....	0 45 12.8	164 4 37	e F	441
2358	Δ. 5	0 46 11.7	164 18 17	p F; p L; R; v g l b M; r	625
		11.8	18 46	e F. [This obs. gives 47 for the minute of R A. The earlier minute preferred.] In a sweep below the Pole.	441
2359	Δ. 530?	0 46 51.9	128 37 20	B; v L; v g p m b M; v m E; irreg fig; 8′ to 10′ l; 3′ or 4′ br; has subordinate nuclei. See Pl. V. fig. 10.	486
		53.5	36 13	F; v L; v g b M; 4′ l, 2′ br; has another neb attached	488
		12.1	36 14	A very faint nebula attached to the large one of ʃ 488 No. 36, or a subordinate nucleus.	488
		..	37 56::	A large oval nebula containing 3 stars. [N.B. *Mr. Dunlop's neb* 530 *is described by him as easily resolvable into very minute stars. Its identity with this is therefore very doubtful.*]	803

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2360	....	0 47 17.0	163 6 52	p B; v S; R; v l b M; 15″; r	625
		17.6	7 4	F; v S; R; g l b M; r; 15″	482
		18.8	7 28	An extremely small *bright* knot of the Nubec. Min. 15″ diam	738
		20.8	7 16	p B; v S; R; 12″; r. Situate at the upper limit of the nubecula which here is starry. At the other it is nebulous.	745
2361	....	0 48 11.8	163 9 48	An extremely small *faint* knot of the Nubec. Min. 15″ diam	738
2362	....	0 48 44.0	122 52 23	F; e S; R; s b M to a stellar nucleus	494
		44.5	53 36	e e F; v S; almost doubtful whether really the object looked for. Has a p B ∗ following 2′ dist. (N.B. The coincidence of the places destroys this doubt.)	620
2363	....	0 48 42.0	143 41 52	F, S, R, 15″ follows a star 12 m on same parallel	730
		44.4 :	41 55	v F; S; R	498
2364	....	0 49 16.1	131 22 23	F; S; Stellar; the bad definition of a south-easter prevents certainty, but I think it is not a star.	638
2365	....	0 49 16.7 ::	143 53 45 ::	v F; S; R. The R A may err several seconds. The P D also is not very good.	498
		....	....	Viewed; found exactly in place of No. 29 ƒ 498. p B. S. R. b M. 15″. there is also another, pos = 36°.8 Δ P D = 4′.	730
2366	....	0 49 31.5	143 49 45	v F, l E, v g b M. Place from No. 29 ƒ 298 pos 36°.8 Δ N P D = 4′....	730
2367	Δ 23	0 50 23.3	163 23 18	⊕. A small v B, highly comp. oval cluster 2′ l; 1′ br; v g b M stars = 13 m.	738
		24.0	23 20	A resolved, v comp. somewhat oval cluster of close-wedged stars 13 . . . 15 m	745
		25.1	22 49	⊕; S; B; little Elliptic; g b M; 2′. Fairly resolved into rather large and not *very* crowded stars.	482
		25.9	23 12	⊕; v B; S; l E; r or resolved; 90″ l, 60″ br; a close compressed knot of stars with outliers.	625
		26.4	24 10	p B; S; oval; resolved; 60″	441
2368	....	0 50 44.9	126 3 9	F; S; R; g l b M; makes a triangle with 2 st. s. of neb	493
		45.1	3 6	e F; S; R; at the northern angle of an equilateral triangle formed with two stars 11 m.	635
....	....	0 51 ..	162 55 ..	The upper edge of the Nubecula Minor.—Resolvable	745
2369	....	0 52 16.2	165 22 12	v F; L; R; v g b M; 3′ or 3½′ diam.	622
2370	Δ. 25	0 53 17.0	163 5 21	Cluster; imperfectly resolved; rather irregular figure; 5′ diam. Not equally condensed about centre; fades imperceptibly; has a double star (12 = 12 m) in centre.	482
		17.5	5 54	B; L; irreg fig, with a ∗ 13 m in most comp. part	745
		19.5	5 58	B, L neb with r centre; irregularly E into a kind of broad train as in figure (Pl. IV. fig. 6) gently graduating away to the borders. 6′ diameter.	738
		19.6	5 37	B; L; irreg R; g m b M; 3′ or 4′ in extent; fades away insensibly	625
		19.6	6 42	B; L; p m E; p g m b M; 5′; r (ill seen, below the pole)	441
2371	....	0 53 25.0	144 9 24	e F; S; R. (N.B. The R As in this sweep open to error of some seconds)	498
		27.8	9 42	e e e F seems to have a v F star involved	730
2372	....	0 56 17.6	156 31 12	e F; v m E; v l b M; a Ray nebula, pos = 145°.4	508
2373	....	0 56 19.2	126 3 15	F; R; l b M	635
		19.9	3 41	F; S; R; g b M; 20″	493
2374	Δ 55 ?	0 56 24.4	162 32 42	v F; L; oval; v g v m b M	441
		31.6	31 48	e F; p L; R; v g b M	738
2375	Δ 62	0 57 21.5	161 45 42	⊕. v B; v L; p g v m b M. Diam. of more condensed part = 60ˢ ± in R A; but there are loose stars to a considerably greater distance, st. 13 or 14 m all nearly equal and distinct, but run into a blaze in centre.	510
		25.3	45 22	⊕; v B; v comp; p s v m b M; 4′; all resolved into stars 13..15 m	625
		26.1	45 52	v B; v L; p s v m b M; R; 5 or 6′ diam. All resolved	509
		28.8	45 48	A fine, highly condensed ⊕. p s b M; diam 4′	482

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2376	Δ. 31?	0 57 50.7 :	162 57 43	Cluster, 6th class; F; R; 10′ diam. Stars 15....18 m (below pole)	441
		57.1	57 57	v F, L, p. rich cluster; 6th class. Stars 14 ... 15 m..................	482
		57.5	57 32	F, L, p comp. cl of 6th class. 10′ diam. g b M; stars 12 ..... 16 m;—in some parts almost nebulous.	625
		60.0	58 58	Cluster 6th class; stars 12 ... 15 m, a few = 10 m and one of 9 m; m comp. M; fills field and has loose straggling lines and crooks branching off.	738
		61.3	58 33	F, L, cl; l. comp; g b M; 7′ diam; resolved into st 14 .... 16 m......	745
2377	....	0 58 5.8	121 5 34	v F; S; R; g l b M; 15″	495
2378	....	0 58 30.0	163 44 3	p F; S; R; r; pretty compact	482
		30.4	44 6	⊕; a v S, v B knot of visible stars 15 or 20″ diam. almost like a solid mass	625
2379	....	0 59 47.6	162 54 18	v F; p L; R; g l b M; 2′..	745
2380	....	1 0 45.1 :	137 35 13	A star 7 m? After a long and obstinate examination with all powers and apertures I cannot bring it to a sharp disc and leave it, in doubt whether it be a star or not. The star B 137 immediately preceding offered no such difficulty, giving a good disc with 320. [*No doubt a "Stellar Nebula".*]	490
2381	....	1 1 38.4	160 47 7	F; R; v L; v g l b M; 3′..	509
2382	....	1 1 45.2	126 41 4	e F; R; S near a v S star	802
2383	....	1 2 11.7	126 23 45	v F; R; g b M; 20″	486
		14.7	24 41	v F; S; R; g l b M; 15″	803
2384	....	1 2 29.1	162 40 11	v F; p L; R; v l b M; 2′	625
		31.6	40 32	e F; p L; R; g l b M; 2′	745
2385	....	1 2 30.6	121 7 36	F; p L; R; g b M; 60″..	495
		31.6	7 45	F; R; v g l b M; 40″ the preceding of two	645
		33.8	6 58	Not v F; p L; R; g b M; 60″..	494
2386	....	1 2 42.3	163 15 56	p F; R; g b M; 40″ in a field rich with stars 11 .... 15 m	625
		42.9	16 23	p B; R; g b M; 60″	738
		43.9	16 7	F; R; 40″...	745
		44.6	15 39	F; S; R; 30″	441
2387	Δ. 36?	1 3 7.1	163 47 47	B; R; g b M. 80″	745
		9.1	47 44	p B; L; R; v g l b M; r; 3′	482
		10.1	47 48	B; R; g b M; 2′..	738
		13.0	47 8	p B; p L; R; 2′. Has two stars near	441
2388	....	1 3 14.1	120 8 39	e F; S; l E; 20″; foll. of 2	645
		17.7	8 6	v F; S; E; g l b M	643
2389	....	1 3 34.6	128 59 16	v F; S; R; g l b M; 18″	803
2390	....	1 4 17.2	122 59 33	The suspected Nebula of ∫ 493 re-examined. I believe it is only 3 v F st. but yet there remains a suspicion of nebulosity.	635
		20.8	59 13	Rather doubtful, but I strongly incline to the suspicion of its being a v F neb with 2 v S stars near it.	493
2391	....	1 5 6.1	152 33 30	p F; S; R, g b M; 15″ has a ✱ 12 m following. Place liable to some error owing to some temporary unsteadiness in the apparatus.	501
		....	27 ±	F. S. R. Observed when past meridian so that no R A and only a very rude P D could be obtained.	734
2392	....	1 5 23.8	149 9 25	p B; S; R; b M; 30″ (R A uncertain)	735
		30.1	9 31	B; R; p s b M; 40″	504
2393	....	1 5 43.2	128 48 51	v F; S; R, g l b M. 18″	803
		45.2	48 20	p B; R; p g b M; 20″	486
2394	....	1 5 46.4	122 38 49	p B; S; R; g b M	645
		48.9	39 13	p B; R; b M; 20″	494
2395	....	1 5 51.4	122 44 ±	v F; S; R; g b M. (P D a rough estimate from that of the nebula immediately preceding).	645
		52.4	41 3	p B; R; b M; 20″	494
2396	....	1 6 59.9	149 11 20	F; v S; R; 12″	735
		60.9	11 21	F; S; R; 15″	504

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2397	....	1 7 20.7	146 18 12	v F; S; R; b M; 15″. R A may err several seconds being only roughly determined by an auxiliary star, having passed beyond the field.	500
2398	....	1 8 8.0	164 12 11	Chief centre of condensation at southern edge of an irreg. figured nebulous mass 2′ diameter.	745
2399	Δ. 7	1 8 52.7	164 11 51	F; p L; irreg fig; r; 2′. Nebula and stars the first of an irregular line ..	625
		62.7	11 38	p B; p L; irregular nebula with many stars. [The first of an irregular line of 3 nebulæ and many stars].	738
		66.5 ::	11 30	A resolved nebula or cluster of irregular figure	441
2400	....	1 9 30.6	124? 15 44	p B; R; g l b M; 20″. [*This nebula was looked for in the place here set down in sweep* 635, *but was not seen. The observation, however, in sweep* 493 *is distinct and regular, so that there is no doubt of the existence of such a nebula, at this* R A, *within the zone swept* (123° .... 126°). *In all probability, therefore, the degree was wrong read off, and instead of* 124 *should be* 123 *or* 125. *The minute can hardly be wrong.*]	493
2401	Δ. 60	1 9 43.4	162 26 46	p B; p L; R; g b M	625
		50.2	26 46	F; L; R; v g b M; 4′ diam	482
2402	Δ. 8	1 9 56.9	164 12 45	irreg R; r; 60″ The second of a train of F. nebulous clustering patches which run across the field.	745
		57.8	12 18	p B; p L; irreg; the 2nd of an irreg. line of mixed neb and st	738
		59.2	11 42	S; R; a resolved nebula or cluster	441
		62.5	12 11	F. R; g b M; r; 60″	625
2403	....	1 10 32.3	149 48 18	v F; R; g b M; 30″	736
2404	Δ. 9	1 10 53.4	164 14 8	The third mass in an irregular line of loose stars and nebula. p B; p L; irreg fig.	738
2405	....	1 12 42.8	131 52 22	e F; l E; 20″. A difficult object but *certain* after long attention with the left eye.	638
2406	....	1 12 55.2	149 25 20	v B; S; l E; p s b M	735
		58.3	24 46	v B; S; l E; p s m b M	504
2407	....	1 13 29.3	124 57 31	p B; S; R; l b M	635
		31.4	58 0	B; v l E; p g m b M; near a v S star	493
2408	....	1 16 9.0	125 57 10	p B; S; rather a doubtful object. The preceding of two	486
		12.7	58 46	F; S; l E	803
		16.2	56 49 :	v F; S; l E; this is the "doubtful" neb of a former sweep	802
2409	....	1 16 12.5	126 0 20	p B; S; E; b M; 20″. The following of two	486
		14.2	0 46	F; S; R or l E	803
		18.7	0 14	p F; S; l E	802
2410	....	1 17 0.3	129 0 56	e e F; S; R; v g b M	803
		3.1	2 21	e e F; S; b M	638
2411	....	1 17 29.6	128 58 26	e e F; S; R; v g b M	803
		30.4	58 21	e e F; the s p of two which form an equilateral triangle with a star 13 m ..	638
2412	....	1 17 30.6	128 57 6	e e F; S; R; v g b M	803
		31.9	56 21	e e F. The n f of two	638
2413	....	1 17 45.6	128 54 6	e e e F; S; R; v g b M. The 4th of a group of 4	803
2414	....	1 20 15.6	126 36 24 :	v F; S; R	802
2415	....	1 21 0.2	130 11 46	e F; S; attached to a minute star, and very near a bright one	488
2416	....	1 21 21.8	126 28 40	A Double Star. The left eye leaves no doubt of its being involved in v F. neb. diffused over 15″. An extremely delicate and difficult object. Pos. of the double ✱ 225°.; dist 4″; 15 and 16 magnitudes.	486
		35±	28 58 :	v F; S; R; R A only rough being already beyond the field	802
		....	30 ±	There is a nebula but I perceive no D ✱ in it. Obs. past merid and R A not taken.	803
2417	....	1 22 1.6	142 28 14	F; S; R; b M among 5 or 6 stars 11 m	498
2418	....	1 22 18.0	113 33 5	B; L; p m E; g p m b M; 3′ l, 2′ br	641
2419	....	1 24 31.3	124 23 13	v F; R; 25″	493
		31.4	22 29	F; S; R; b M; 15″	635
2420	....	1 24 55.6	129 34 14	v F; p L; R; v l b M; 2′; has a double ✱ 5′ or 6′ n f	638

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2421	Δ. 17	1 25 42.8	164 26 25	B; R or l E; p s b M to a ✱; has also a ✱ involved which looks like a second nucleus and several small st about it.	745
		46.9	25 27	p B; S; irreg R; p s b but not to M, but rather to a point near the southern edge. Is decidedly resolved, and has scattered st. (This is an outlier of the Nubecula Minor.)	441
2422	I. 281 h. 139	1 26 22.4	120 16 27	p B; v m E; p s l b M; $2\frac{1}{2}'$ l. No other near it within 3 fields in R A and 1 field's breadth in declination.	644
		23.9	17 5	v B; L; v m E; p s p m b M; has a ✱ 10 m; n f	645
		25.8	17 13	v B; v L; v m E pos 118.3; 1st g then s m b M to nucl 4′ l $1\frac{1}{2}'$ br has a ✱ 9 m n f.—(N. B. The place assigned to I. 281 in my former Catalogue is R A 1^h 27^m 22.9^s N P D 120° 22′ in which it is now evident that the minute in R A is there mistaken, and the N P D materially in error, since by the remark in sw 644 it appears that there are not two distinct nebulæ in this place. The difference of the descriptions is explained by the low situation of the object in the latitude of Slough.)	494
2423	....	1 26 23.8	127 22 44	F; R; 12″ follows a ✱ 12 m. This is possibly identical with the next but one, with a mistaken minute.	822
2424	....	1 27 17.3	127 21 36	e e F; v S; R; the preceding of two in field together	803
2425	....	1 27 29.8	127 21 56	F; S; R; the following of two. Possibly identical with the last but one. (Both rightly reduced.)	803
2426	Δ. 479	1 27 38.8	132 18 19	B; p L; m E, nearly in the parallel; p m b M	489
		41.2	18 3	B; L; m E; g b M; $1\frac{1}{4}'$ long	753
		....	19 ..	B; m E; g b M; 80″ P D rough being taken 2 fields past the meridian ..	752
2427	....	1 27 43.2	130 1 6	p F; S; R; b M; 15″..	488
2428	....	1 28 8.5	130 12 58	p F; S; R; b M; 15″. Precedes 2 st 11 m	638
2429	....	1 28 49.1	128 11 20	p B; S; R; g b M; 15″. Follows a pretty bright D star..............	486
		50.6	11 35	Not v F; R; 30″. Has a double star n p..........................	802
2430	....	1 31 7.4	120 47 17	v F; (sky cloudy). The preceding of two...........................	644
		8.5	48 10	e e F	645
		11.6	46 43	v F; v S. The preceding of two	494
2431	....	1 31 15.5	120 46 30	v F; p L	645
		15.9	46 12	v F; (sky cloudy). The following of two	644
		18.1	46 38	F; S; R; g b M; 15″. Has a star near it, following	494
2432	....	1 31 21.1	133 23 19	p B; S; R; g p m b M. The preceding of two	489
		21.8	23 33	F; S; R; 20″	753
		....	24 ±	F; S; R; P D rough, being taken when considerably past merid.........	752
2433	....	1 31 32±	133 27 ±	e F; R. Place roughly obtained from that of the foregoing neb from which its position is 144° (= 54° s f).	753
		35.5	26 8	F; S; l E; g l b M. The following of two..........................	489
2434	....	1 31 57.9	155 45 49	v F; irreg. R; v g l b M..	508
2435	....	1 32 12.7	166 24 47	e F; R; v g l b M; 40″	622
		12.9	25 45	v F; R; v g b M; 40″. Reduced on the supposition of a mistaken wire (1st for 2nd). And there can be no doubt that this supposition is correct; as (independent of the coincidence of results) were it otherwise this nebula must have been in the field of view at the moment of observation in sweep 622, and, being at least equal in brightness to that actually observed, could not fail to have been noticed.	746
2436	II. 481?	1 40 48.2	101 16 4	F; R; g l b M; 35″	650
2437	III. 459 h. 155	1 40 57.1	114 38 33	v F; v S. Requires attention to distinguish it from a star	646
2438	....	1 41 12.0	143 38 5	F; v L; R; v g v l b M; 3′	498
2439	....	1 41 45.8	139 28 30:	v F; R; g b M; 20″	744
		54.9	29 30	B; R; g b M; 30″.—(N. B. Both observations are correctly reduced, but there is an obvious error of 10^s in one or other, arising from mis-reading or mis-registering of the chronometer; and I consider the obs. in sweep 744 to be more open to that mistake than that of sweep 497.)	497
2440	....	1 42 13.1	125 47 53	F; S; R; 15″	802
2441	....	1 42 22.4	125 43 5	v v F; S..	802

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2442	I. 62 h. 160	1 42 39.1	100 32 34	e F; p L; certainly not entitled to a place in the 1st class.—(N.B. The Right Ascension here set down is of course to be preferred to the rough R A (1.42.54±) of my former Catalogue.)	650
2443	I. 105 h. 165	1 44 45.2	104 34 46	p B; l E; p s m b M; 40′	649
2444	III. 460 h. 166	1 45 50.3	114 35 52	p F; R; g b M; 25″. No other neb within 15′ all round.—(N.B. This remark shows that the nebula No. 167 of my former Catalogue is really identical (as there suspected) with III. 460.)	646
2445	....	1 46 24.5	126 43 20	F; S; R; b M; 15″. [*It is barely possible that this and the next nebula may be identical with* Nos. 2441 *and* 2442 *by a mistaken degree in* P D.]	486
2446	....	1 46 31.5	126 40 56	e e e F S R. R A only rudely taken by a star, being out of the field	803
2447	III. 266	1 46 48.0	99 53 24	e e F; 40″	650
2448	....	1 47 58.7	120 45 12	p B; l E; p s b M; 35″	644
		60.2	45 6	p B; p m E; p g p m b M; 30″	645
		61.9	45 33	B; S; E; p s b M	494
2449	....	1 48 9.0	147 31 38	p B; R; g b M; 30″	503
2450	....	1 48 24.5	147 35 43	v F; S; R; b M	503
2451	III. 464 h. 178	1 48 28.7	96 14 18	v F; E; v l b M; 30″	739
2452	III. 468	1 50 32.7	102 19 41	F; R; g l b M; 20″	649
2453	....	1 50 36.5	117 7 18	p B; S; R; g b M; 18″	643
		46.0	7 18	F; S; R; g l b M; the reductions having been examined and found correct, a mistake of 10ˢ must have been committed in reading or registering the chronometer in one or other of these observations. There is no apparent reason for preferring either.	646
2454	....	1 51 56.1	148 36 58	p B; p L; l E; attached to a star 12 m	503
2455	....	1 53 52.4	146 39 13	p F; S; R; makes an obtuse angled triangle with 2 st 11 m	503
2456	....	1 54 37.4	165 3 9	Somewhat doubtful, but I believe it is a v F neb involving a v F ✻	745
		40.5	3 5	F; v S; R; has a ✻ 12 m 25″ dist. 45° n p	622
		43.1	3 0	e F; S; R; 10″ close to a v S star	746
2457	....	1 55 3.3	158 41 26	e e F; v S; R; has a ✻ 13 m preceding, dist 100″	508
2458	h. 192	1 56 6.5	114 7 20	v F; l E; g b M; 25	646
2459	....	1 57 46.1	159 16 1	p F; R; g b M; 30″	513
2460	h. 196	1 59 34.9	116 16 17	A v F double ✻ involved in a v F nebula	646
2461	....	1 59 38.1	131 58 33	F; R; s b M; r; 15″ a difficult object	489
		44.8	57 13	v F; v S; R; 12″	752
2462	....	1 59 40.0	126 16 46	F; R; 30″; v s v m b M to a ✻ 13 m	803
		42.8	18 55	F; R; 40″; v s v m b M to a ✻ 12 m	802
2463	II. 482 h. 199	2 1 2.2	100 56 14	e F; S; R; 1st of a group of 4	650
2464	II. 483 h. 200	2 1 3.7	100 56 24	v F; S; R. The 2nd of a group of 4	650
2465	II. 484 h. 201	2 1 17.4	100 57 14	v F; S; R. The 3rd of a group of 4	650
2466	II. 485 h. 202	2 1 22.9	100 59 24	v F; S; R. The last of a group of 4	650
2467	....	2 3 16.0	147 32 8	p F; R; g l b M; 40″; r	503
2468	....	2 4 17.4	126 39 30	p B; l E in merid; 40″ l; g b M	486
		17.7	37 40	v F; S; l E; 15″ l 12″ br	801
		24.8	40 16	p F; l E; g b M (R A correctly reduced)	802
		....	39 ±	v F; R; place roughly taken being past the meridian	803
2469	....	2 5 11.5	122 45 3	p B; S; p s m b M	645
		12.7	44 22	B; S; E; p s m b M; 18″	644
2470	....	2 6 9.8	132 50 2	p F; v S; s v m b M, like a blurred star	489
		13.1	49 23	F; R; g b M; 30″	752

No.	Synon.	R. A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2471	II. 474	2 8 15.3	102 8 40	F; R; b M; 60″; ill observed in a south-east cloud	648
	h. 209	15.3	8 24	F; R; g l b M; 40″	650
		16.9	8 1	Not v F; p L; R; v g b M; 50″	649
2472	....	2 12 16.2	132 31 35	e F; v S; R; p s b M; has a ✱ 7 m s f and 6 other S st intermediate ..	489
		21.4	31 10	F; R; g b M; 20″	752
2473	....	2 12 26.9	150 38 30	e F; S; R; has two small stars very near it	501
2474	....	2 13 8.3	132 11 15	p F; R; p s l b M; 40″ has a ✱ 8 m following in parallel	743
		10.2	11 22	Not v F; R; p g b M; 35″ has a ✱ 9 m foll 4′ dist	638
2475	....	2 13 52.5	124 29 49	p B; S; R; p s b M. Has a ✱ 10 m exactly foll in the parallel just at the edge or 35″ dist from centre.	635
2476	....	2 14 3.0	111 35 30	p B; l E; g b M; r; 30″. Has a coarse double ✱ prec.	642
2477	III. 224	2 15 10.7	111 28 50	F; E in parallel; g l b M; 20″ l	642
2478	III. 239	2 17 23.4	115 34 27	p B; R; g p m b M; 60″	646
2479	....	2 19 50.0	135 12 8	v F; S; R; g l b M; 15″	805
		52.1	12 45	e F; S; v l b M; 20″	634
2480	II. 487 h. 225	2 20 22.7	101 18 14	e F; L; R; g l b M; 2′	650
2481	....	2 20 37.6	109 48 12	p B; E; g b M; 50″ l, 35″ br	640
2482	....	2 22 6.1	132 10 15	v F; l E; g b M; 25″	743
		6.6	9 43	F; p L; l E; has a ✱ 8 m 3′ dist, s f	489
		10.7	9 15	e e F; p L; R; 40″ n p a ✱ 11 m.—(N.B. The night appears to have been hazy and was interrupted by cloud.)	639
		14.0	9 17	v F; R; 20″.—(N.B. An extraordinary discordance in the observed Right Ascensions of this object, for which I can assign no reason.—The reductions are correct.)	752
2483	....	2 24 3.2	126 47 35	B; p m E; p s b M; 30″ l; position 215°.7	486
		10.7	48 30	p B; m E; g b M; 80″ l, 15″ br	802
		....	47 30	p B; S; l E. Transit lost owing to a passing cloud	636
		....	45 47	No description—observation evidently hurried	801
2484	....	2 24 13.1	107 57 42	p F; S; R; p g m b M; 25″	640
		14.1	57 37	e F; irreg R; l b M	741
2485	III. 472	2 24 49.4	101 30 39	e e F; S; R	650
2486	....	2 25 15.3	135 16 25	Not v F; S; R; almost stellar; between 2 st nearly in the parallel	634
		22.4	16 21	F; S; R; g b M. 15″. [Both R A's correctly reduced]	805
2487	Δ. 519 ?	2 26 47.4	129 47 13	p B; L; p s b M. 3′ l, 2′ br; either Binuclear or more E on the n f side than on the opposite. *No other neb near it.*	638
		48.5	47 19	B; L; p m E; v s m b M; 100″ l, 60″ br. Unequally bright, and exhibiting an approach to the Binuclear form (See Plate VI. fig. 14).	743
2488	....	2 30 47.1	145 36 39	e F; S; R. 15″ the preceding of two	732
2489	II. 284 h. 249	2 31 8.8	98 52 14	v F; p m E; has a v F star at the s f extremity	650
2490	....	2 31 12.1	145 36 9	F; S; R; g b M; 20″; the following of two	732
2491	II. 488 h. 253	2 32 17.4	102 1 15	p B; R; b M; 35″. Observed in a south-east cloud-drift	648
2492	....	2 32 43.2	125 0 10	p B; S; R; like a star 12 m a very little rubbed at the edges, a curious little object and easily mistaken for a star, which, however, it certainly is not.	635
2493	I. 63 h. 254	2 32 45.3	98 59 9	p B; R; g p m b M; 30″	650
2494	....	2 36 26.0	119 43 33	B; p m E; s b M; 90″ l, 40″ br	643
2495	V. 48	2 39 4.1	120 59 12	B; L; v m E; p s p m b M; 3′ long; pos = 151°.1	644
		5.5	59 6	B; L; v m E; p s v m b M to a p L, R nucleus; 4′ l, 40″ br	645
2496	....	2 39 34.2	150 37 53	F; R; g l b M; 30″	736
2497	III. 449 h. 269	2 41 10.7	107 42 40	p B; L; p m E; v g l b M; 2′ l, 40″ br	652
2498	....	2 45 42.5	145 39 58	F; R; g b M; taken for No. 3 sw 520, but proves, on reduction, to be a different nebula.	732

No.	Synon.	R. A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2499	....	2 45 51.3	145 45 59	F; R; g b M;—☾	520
2500	II. 470 h. 275	2 46 18.2	100 43 44	F; v S; R; p s b M; stellar	650
2501	....	2 46 44.9	109 20 32	F; v m E; 90″ l, 10″ br; has 2 st 10 mag, f	651
2502	III. 469	2 50 50.7	103 4 51	p F; R; g l b M, 25″	649
2503	....	2 51 40.8	122 47 13	v F; l E. 18″	645
		43.6	46 5	v F; p m E; v l b M; 60″ l, 30″ br	635
2504	III. 245	2 55 4.9	113 32 15	B; v L; p m E; v g b M; 3½′ l, 2½′ br. Has in or near the middle a star 16 m.	642
2505	....	2 55 29.2	102 44 56	v F	649
		....	46 ±	The sp of two	648
2506	II. 475	2 55 48.1	102 40 50	p B; L; R; 80″. The n f of 2, dist about 7½′, pos. 45°	648
		48.2	39 41	p F; R; b M	649
2507	II. 285 h. 285	2 57 58.5	100 12 19	F; R; g b M; 25 to 30″	650
2508	....	2 59 39.4	129 40 58	Not v F; R; p s l b M; 20″. Has a ✱ 11 m 2′ n	638
		....	42 ±	Viewed past merid. Seen in place but v v F, as it began to cloud	743
2509	II. 258	3 2 5.6	111 14 42	p B; L; R; v g m b M 4′ diam	741
		7.3	14 0	p B; v L; R; g m b M; 4′ diam	641
		7.6	13 10	B; v L; R; r; 3′ first v g then p s b M. With the left eye I see it mottled. (N.B. This is no doubt a distant ⊕).	642
2510	II. 286 h. 289	3 2 59.4	99 33 59	F; p m E; 50″ the preceding of two	650
2511	III. 591 h. 291	3 3 8.9	99 35 20	e F; R; the following of two; pos from the other = 120°	650
2512	Δ. 205??	3 4 16.8	157 25 16	p F; l E; g b M; 25″	508
		20.8	26 9	F; S; p m E; g b M (growing cloudy)	512
		....	....	Seen found in sweeping for Δ 205 below the sweep. It has about the same R A but farther south. Only this neb found.	631
2513	....	3 4 52.1	157 35 36	p F; R; g l b M; 15″	508
		59.6::	36 38	Not v F; S; R; b M. (R A roughly taken by the intervention of an auxiliary star, being past meridian when observed).	512
2514	....	3 5 4.4	143 59 8	B; L; v m E in pos 80°; v g b M *to an axis*; 2½′ l, 1′ br	520
		....	....	Found in place and viewed p M, but very faintly seen	732
2515	....	3 6 23.3	148 27 9	Star 8 m the chief of a cluster of 18 or 20 stars	519
2516	....	3 6 26.9	112 37 35	F; S; almost stellar; but E; has a ✱ 8 m prec 7½′, 2′ n	642
2517	Δ. 337	3 7 35.4	145 51 44	p B; R; v g b M; 3′; resolved into st 15 m. A very faint nebula (??) precedes.	732
		37.8	51 33	⊕; B; L; irreg R; 2½′ diam; all resolved into equal stars 14 m.—Has a ✱ 9 m 45° n f 3′ dist.	520
2518	....	3 8 35.6	131 43 11	v B; R; g m b M (hazy)	743
2519	III. 956	3 9 35.5	100 55 24	e e F; barely perceptible	650
2520	....	3 10 21.4	123 12 25	v F; L; R; v g l b M; 2½′ diam	645
2521	Δ. 487	3 11 4.3	131 43 11	v B; R; g m b M; 90″ (hazy)	743
		14.4	43 43	⊕; v B; R; 1st g, then s v m b M; r, mottled, but not resolved. (N.B. There must have been a mistake of 10ˢ in reading or registering the chronometer in one or other of these observations. The reductions of both are correctly performed.)	754
2522	....	3 12 0.3	110 1 35	p F; v L; 1st g then p s b M to a F nucleus; m E 8 or 10′ l, 2′ br	741
		2.0	1 59	B; v L; 1st v g then p s v m b M; 3′ l, 2′ br. m E. (N.B. These dimensions can only refer to the brighter portion.)	652
2523	I. 106	3 14 12.6	106 0 25	p F; R; g l b M; pos from a ✱ 7 m = 31°.0; Δ R A = 7ˢ.5; ✱ 4′ s	651
2524	....	3 14 32.2	127 48 40	v F; R; p L; v l b M; 90″. (P D evidently 5′ too large)	636
		32.6	43 45	⊕; v F; R; p L; v g v l b M; r; 90″ ..... 2′ diam	801
		33.1	43 12	F; L; R; g l b M; 2′	802
2525	....	3 15 7.8	142 47 33	F; m E in position 37°.3; g b M; 2′ l, 15″ br	807
2526	....	3 15 34.7	111 58 50	p B; R; g b M; 25″	642

No.	Synon.	R. A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2527	Δ. 548	3 16 11.3	127 50 49	v B; v L; 4′ diam, 1st g, then v s, v m b M to a stellar nucleus	801
		12.4	49 30	v B; p L; l E; v s v m b M, to a nucleus 2″ diameter	636
2528	Δ. 206	3 16 13.2	157 6 9	p B; irreg R or l E; v L; v g b M; r; 3′	508
2529	Δ. 547	3 16 13.8	107 42 49	p B; p L; 1′ diam; a miniature of the last neb of this sweep	801
		14.9	43 0	p B; S; R; p s b M	636
2530	III. 197 h. 298	3 16 18.0	93 38 4	F; R; b M; 20″. The first of 3	739
2531	III. 196 h. 297	3 16 18.5	93 37 4	Not v F; v S; E; 6 or 8″; 2nd of 3. Query if not a nebulous double star.	739
2532	....	3 16 20.5	93 32 24	F; R; b M 15″. The 3rd of 3	739
2533	....	3 16 25.7	112 7 30	F; S; R; b M; 15″; precedes IV. 77	642
2534	IV. 77	3 16 58.2	112 8 10	F. Attached cometically to a ✻ 9 m which forms its head. It is an exact resemblance of Halley's comet as seen in the night glass. Pos. of tail = 239°.1.	642
		58.2	8 25	A complete telescopic comet; a perfect miniature of Halley's, only the tail is rather broader in proportion; m E; 90″ l; the star at the head = 10 m. See fig. 17, Pl. VI.	641
2535	....	3 17 28.4	127 4 50	60″ diam; v s v m b M to nucleus; ? a disc	802
2536	....	3 18 17.3	108 11 25	F; R; g l b M; 30″	652
2537	....	3 19 57.6	126 17 38	F; S; R; g p m b M; 15″	801
		58.0	19 30	v F; R. (Clouding over rapidly)	636
		65.7	19 39	v F; l E; 40″	802
2538	....	3 21 16.3	122 52 28	B; R; p s m b M. A double star precedes	645
		18.9	52 42	p B; R; p s l b M; 40″	644
2539	....	3 21 25.3	121 29 32	v B; l E; p s b M; 45″	645
2540	....	3 21 31.3	127 44 31	F; S; R; has a ✻ 12 m s f	802
2541	....	3 21 48.3	108 22 29	v F; R; p s l b M; 20″	652
2542	I. 257	3 21 49..	121 41 ..	R A by working list; P D roughly taken; Transit missed while observing another nebula.	644
2543	....	3 23 55.9	109 51 52	e F; S; p s l b M; has a ✻ 8 m s f. Very difficult and probably not to be seen without a recently polished mirror, such as was used in this observation.	652
2544	....	3 23 58.3	125 26 24	p B; R; p s b M; 30″	635
2545	Δ. 591	3 23 ±	124 19 ±	B; L; m E, but with a R nucleus much brighter than the environing F atmosphere. P D roughly taken. Transit missed, the observation having been lost by relying on the R A given in Mr. Dunlop's Catalogue (3^h 25^m) which is too great. That here set down is assumed at random as probably nearer the truth.	635
2546	III. 246	3 24 31.7	111 23 50	B; L; p m E; p s m b M; 2′ l	642
		32.5	24 8	B; m E; g m b M; 90″ l, 40″ br	641
2547	III. 487	3 24 38.7	105 47 45	v F; S; l E; g l b M; 25″	651
2548	II. 290	3 25 19.4	104 15 11	p F; p L; R; 40″ near 3 st, 2 of which are 10 m	649
		20.3	16 2	p B; R; first v g then more s, b M; 70″	757
2549	....	3 25 35.6	140 52 33	v F; R; g b M; 40″	806
		38.5	51 43	v F; p L; irreg; near stars	807
2550	....	3 26 7.9	110 4 48	F; L; R; v g l b M; 2′	741
2551	III. 559	3 26 18.0	110 52 51	v F; S; R	652
		18.7	51 35	v F; S; R	642
2552	....	3 27 8.4	126 42 37	A very remarkable neb. A decided link between the nebulæ M 51 and M 27. Centre v B; somewhat extended; g v m b M; a ✻ 13 m near the edge of the halo involved. The area of the halo v F; general position of the longer axis 20°.8 whole breadth = 3′. See Pl. IV. fig. 1.	801
		10.2	42 43	v B, E, resolvable nucleus; or has 2 or 3 st involved; the preceding Arc is the brighter. I think the oval is in some degree filled up to the south.	802
2553	III. 857	3 27	121 47 ..	Place from working list. Seen sweep 644, but under circumstances not admitting an observation of its exact place.	644

No.	Synon.	R. A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2554	III. 960	3 27 38.4	110 57 2	e F; S; R; between 2 very faint stars	741
		41.0	56 50	v F; R; situated exactly between 2 stars 14 m (about one semi-diameter from either edge by diagram).	652
		41.9	56 45	e F; S; R; v l b M. Situate between 2 v S stars	642
2555	II. 262	3 27 44.5	115 30 28	B; L; R; p s b M; 2′. (The P D differs 4′ from the working list, but it is expressly stated in the obs. that the index was correctly read, the difference having doubtless been noticed at the time.)	646
2556	....	3 28 41.3	125 48 29	e F; v S; the preceding of 3	802
2557	....	3 28 51.3	125 47 9	v B; p L; l E; g m b M; the 2d of 3	802
2558	....	3 28 51.3	125 49 49	B; S; l E; p m b M; the 3d of 3 of the same R A as the second	802
2559	Δ. 574	3 29 ±	125 35 ±	v B; L; R; p s b M. A fine nebula. The obs. of the place like that of Δ 591 above was lost by setting the instrument on the place given in Mr. Dunlop's Catalogue, and relying on his R A ($3^h\ 31^m$) which is too great, instead of sweeping over them, when they could not have escaped being regularly taken.	635
2560	III. 961	3 29 8.3	111 27 15	F; S; R; g b M; 15″	642
		9.7	28 21	F; S; R; b M; 15″	641
2561	....	3 29 33.5	126 1 5	⊕; p B; R; g p m b M; 70″	660
		......	....	v B. Seen but no place or description further	801
2562	....	3 29 58.5	108 54 20	p F; v S; R; p s m b M	652
2563	II. 263	3 30 9.6	115 4 6	B; R; g p m b M; 40″	646
2564	....	3 30 25.8	126 4 35	⊕; v B; R; g m b M; 90″. A globular cluster in all probability identical with this, was also seen in sweep 636, while searching beyond the meridian for Δ 562.	660
		......	....	v B: the 1st of 3, seen but no place or further description	801
2565	III. 451	3 30 58.6	108 59 34	p F; R; g l b M; 30″	652
2566	I. 58	3 31 5.9	113 34 15	v B; p m E; p s m b M; 60″ l	642
		5.9	35 35	B; R; p s m b M; 50″	641
2567	II. 593	3 31 50.0	109 15 27	B; R; p s m b M; 30″	741
2568	III. 247	3 31 55.7	113 16 45	v F; S; R	642
2569	....	3 31 57.2	126 1 45	⊕; v B; p L; p s b M; r or resolved; 2′	636
		68.5	125 59 58	v B	802
		....	....	v B; the 2d of 3, seen but no place or further description	801
2570	I. 107	3 32 34.3	109 8 18	v B; L; R; first v g, then v s, v m b M; 3′	652
2571	....	3 32 34.4	126 8 45	v B; R; p s m b M; 40″; has a ✱ n f	802
		....	....	v B; the 3d of 3, seen but no place taken or further description	801
2572	....	3 32 37.6	121 52 22	F; v m E; v g l b M; 2′ l, 20″ br; a ✱ 7 m precedes in parallel	644
2573	....	3 33 4.7	134 39 39	B; R; v s v m b M; 20″	639
		5.0	38 51	B; R; p s m b M; 40″	752
2574	....	3 33 20.6	116 46 3	F; S; E; g p m b M; 15″; has a ✱ s f dist 2′	646
2575	II. 267	3 33 30.5	113 6 30	p B; l E; p g m b M; 35″	647
		33.4	6 0	p B; p m E; g b M; 25″	642
		33.8	7 24	p F; E; p s l b M; 40″ l	641
2576	....	3 34 22.6	128 3 55	F; S; R; 15″	660
		23.4	5 0	p B; v S; p s b M; 15″ (clouded)	636
2577	II. 291	3 34 32.0	104 2 36	F; v m E; v l b M; 3′ l, 20″ br; pos = 184°.2	649
		33.5	3 0	F; L; m E; v g v l b M; 90″ l	757
2578	III. 248	3 35 22.0	112 38 50	F; S; l E; g b M; 20″	647
		24.9	39 33	B; l E; p s b M	641
2579	....	3 35 51.4	125 56 40	p F; S; R; p s m b M; 20″	801
2580	Δ. 426	3 36 40.1	137 45 51	B; L; p m E; s m b M; 100″ l, 60″ br	654
		42.7	46 53	v B; L; m E; v s v m b M to nucleus = ✱ 10 m	805

No.	Synon.	R. A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2581	Δ. 562	3 37 ?	126 45 ?	B; p m E; p g b M. The place is taken from Mr. Dunlop's Catalogue, but I have reason to believe this R A too great and the N P D also materially in error—perhaps 126 35 would be preferable. It was found by sweeping past the meridian.	663
		......	......	⊕; v B, and evidently a globular cluster. Observed past meridian, clouds having prevented its place being secured at the time of transit.	636
2582	....	3 37 11.8	126 23 49	F; v L; g l b M; R; 4″	801
2583	II. 458	3 37 22.5	108 48 21	p B; R; g m b M; 40″	741
		24.2	48 16	p B; R; v s m b M to a nucleus = * 13 m; 60″. (N.B. Both observations agree in making the degree of P D 108—whereas it appears in the reduction of my Father's observations as 109.)	652
2584	III. 249	3 37 22.7	112 26 34	F; S; R; g b M; 15″	647
		25.6	27 48	p F; S; R; b M; 20″	641
		25.9	27 55	p B; R; g p m b M; 40″	642
2585	....	3 38 5.6	135 11 6	p B; v L; v m E; 3′ l, 20″ br; pos = 221°.6	654
2586	....	3 38 54.5	135 10 31	F; v m E in pos = 39°.5; 3′ long	805
		58.4	10 55	A ray nebula (v m E) v g p m b M; 2′ l; pos. 42°.3; 38° is no measure..	752
		59.4	11 53	p B; v m E; g l b M; a ray nebula, 4′ l, 20″ br; pos = 38°.0	639
2587	....	3 39 52.7	127 13 33	F; S; R; 15″; attached to a star 14 m	801
2588	II. 460	3 41 2.6	106 55 0	p B; v l E; p m b M; 25″	651
2589	....	3 42 55.3	150 19 58	v F; R; g l b M; 15″. In a constellation of B st forming almost a cluster.	756
		61.4 ::	20 10	F; S; R; b M; 15″; one of a constellation with 7 B stars	501
2590	....	3 45 25.9	162 12 10	F; irreg R; g l b M; 30″; has a * 7 m f, and others near	514
		....	....	Viewed past merid; found in place; p B; R; g b M; 30″	745
2591	....	3 46 34.2	135 2 13	v F; l E; g b M; 25″	805
		37.5	2 16	F; S; p m E in the parallel; g b M; 15″ l	654
2592	....	3 46 40.8	158 44 20	F; p L; R; v l b M; 50″	512
		42.8	43 31	p F; R; g l b M; 25″	508
2593	....	3 46 59.5	110 57 55	e F; S; R; precedes 2 B st and the nebula III. 962	642
2594	III. 962	3 47 6.8	110 59 22	e F; S; makes an obtuse angled nearly isosceles triangle with two st 10 m n of it.	647
		8.8	60 56	p B; l E; g b M (newly polished mirror); makes an obtuse angled triangle with 2 st 10 m to its north	652
		10.5	60 30	F; S; R; makes an obtuse angled triangle with 2 B st, the one preceding, the other following it.	642
2595	Δ. 427 ? ?	3 47 35.4	137 59 4	p F; R; v l b M; 20″. (Newly polished mirror, but the sky dull and haze forming; so that this may very possibly be Δ 428.)	654
		36.9	59 37	v F; p L; R; v g l b M; 80″. I feel convinced this nebula is too faint to have been seen by Mr. Dunlop. Put on the 9-inch aperature, could not discern the least trace of it. Mirror polished yesterday, and in high beauty. Sky superb.	805
2596	....	3 48 2.7	127 29 42	v F; L; E; v g v l b M; 2′	801
2597	Δ. 480	3 50 2.6	132 51 37	p B; R; g b M; 2′ has 2 st 12 m near it	752
		3.0	51 22	p B; p L; R; 90″; makes a triangle with 2 stars 13 m about 1 radius of nebula (by diagram) from its edge.	639
		4.2	53 ::	p B; R; 2′ near a star	804
2598	....	3 51 52.2	125 57 1	v F; v S; R; 10′	801
2599	....	3 52 7.2	156 30 1	p B; S; l E; p m b M; 18″	508
		10.1	31 58	p B; S; R; b M; 15″	512
2600	Δ. 438	3 52 7.3	136 42 5	F; L; R; v g l b M; 2½′. With 9 inches aperture, and a mirror newly polished yesterday, and in high beauty, it is barely possible to discern with the utmost attention that this nebula exists; but to have *discovered* it with that aperture and power 180 would have been quite out of the question; possibly, however, 90 might show it better.	805
		12.2	42 11	F; v L; R; v g l b M; 3′. Sky dull, a haze forming	654
2601	....	3 52 42.1	139 23 50	F; L; R; v g l b M; 2½′; has north of it a triangle of st 12 m	744
		45.8	24 5	F; L; R; v g v l b M; 70″	526

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2602	....	3 52 53.7	134 58 37	F; E in the parallel; v g v l b M; 60″ l, 40″ br	639
		54.3	57 37	e F; l E; S	752
		58.7	58 18	F; p m E; precedes 2 bright stars	804
2603	Δ. 369 ? ?	3 53 46.4	142 48 47	F; v S; R; p m b M; 12″; has ✱ 8 m 15^s.5 prec in R A, to northward	807
2604	....	3 55 11.6	156 30 55	e F; S; R; (a doubtful object.) Has a ✱ n p, 10 m, 3′ dist	508
2605	....	3 55 58.3	143 2 44	e e e F; S; R; between 2 st 12 and 13 m	807
		....	3 41 –	e e e F; S; R; R A not taken on the wires; requires a negative swing correction, being past meridian.	806
2606	....	3 57 59 ±	133 52 37	F; R; v g p m b M; 80″. Not resolved. A companion to Δ 466	752
		63.3	52 38	F; R; g p m b M	804
2607	Δ. 466	3 58 20.0	133 48 57	⊕. B; p L; R; 3′ diam. Resolved into stars barely perceptible	752
		21.2	49 37	B; L; l E; p s b M; 3′. It is just north of a great group of large stars 6, 7, and 8 m, scattered over two or three fields.	639
		22.8	49 38	B; R; g p m b M	804
2608	....	3 58 55.2	158 6 5	p B; m E; v g b M; 90″ l; pos 125°.5	508
		56.1	6 25	B; m E; p g b M; 90″ l, 15″ br; pos 117°.6	653
		58.4	6 47	p B; p m E; S; g l b M; 25 or 30″. (Cloudy.)	512
2609	Δ. 348	3 59 56.0	144 33 48	B; L; v m E; g b M; 3′ l, 40″ br	520
		....	35 ±	B; L; v m E; s b M (by diagram); pos = 10°.0 ±; P D rough. Transit missed.	521
2610	III. 499	3 59 57.0	99 17 15	v F; first v g, then p s, v m b M; 20″	758
		58.1	17 19	e e e F. So very faint that I almost doubt the observation	650
2611	....	4 0 25.6	111 37 55	B; L; p m E; g b M; has a ✱ 8 m s p 3′ or 4′ dist	642
2612	....	4 0 51.8	111 30 30	p B; R; b M; barely in time, and too late for a good observation	647
2613	....	4 1 48.6	143 7 39	e e F; v S; R; 12″. In a very dark field; no ✱ 13 m within 5′	525
		50.3	7 30	v F; v S; R; v l b M; 12″	655
2614	....	4 2 4.9	144 33 29	v F; R	521
2615	....	4 3 8.9	167 17 58	A poor cluster of about a dozen stars 9 . . . 12 m within a space of about 5′, the largest taken.	746
2616	Δ. 409 ? ?	4 3 23.8	138 21 11	B; E; s p m b M, growing more R internally; 60″ l, 30″ br; pos 77° ..	526
		26.0	20 13 :	p B; E; v s b M to a roundish nucleus	744
		....	....	p B; p m E; v s v m b M; seen in sweeping in vain for Δ 409	805
2617	....	4 3 54.0	156 17 0	F; R; g l b M; among B st; one = 9 m, 3′ n	508
		58.1	17 56	e F; v S; R; g l b M; 12″	512
2618	IV. 26	4 4 49.0	103 10 13	B; S; R; first p s, then v g b M; 20″. A mottled disc, but so hazy at the borders that I have no doubt of its being a very distant and highly compressed ⊕. It is not a planetary nebula, though a near approach to one: does not bear magnifying. A power of 320 is of no use. A very remarkable and interesting object. (N. B. The minute of R A certainly correct.)	757
2619	....	4 5 11.0	153 20 51	v F; S; R; g b M; 15″	756
2620	....	4 5 23.7	123 17 ±	B; R; p s b M; 60″. The n p of two. (Pl. V. fig. 11.)	662
		24.9	17 6	p B; R; p s l b M; pos from the following neb = 317°.9	663
		27.9	17 55 :	F; R; b M; 60″. The preceding of two	635
2621	Δ. 600	4 5 29.2	123 19 14	a B ray; p s m b M; 4′ l; the s f of two. See fig. 11, Plate V.	662
		30.4	18 11	p s b M; full 7′ long; position 32°.2	663
		32.4	19 10	B; v L; v m E; 5′ long. A fine and curious object. The following and brighter of 2. In the ray is either a v F ✱ or a knot in the nebula.	635
2622	....	4 6 11.4	146 34 5	v B; R; has 2 st n f	521
		12.8	33 55	v B; p L; R; s m b M to a stellar nucleus. Has 2 st 10 m n f	520
2623	....	4 6 37.1	153 13 11	F; S; R. Has a v S star foll. Dist $1\frac{1}{2}$ rad of neb (by diagram)	524
		6 37.6	15 1	F; S; R. Has a v S star 1 diam s f	756
2624	....	4 7 7.8	121 59 22	v B; l E; p s v m b M; 50″ l; 40″ br	644
2625	....	4 7 26.3	146 55 6	v F; R; p L; v l b M; 60″	519

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2626	....	4 8 19.5	118 54 31	v F; E; r. Rather a doubtful object	511
		20.7	55 16	The suspected nebula of ʃ 511. Certainly verified; v F; g v l b M; 15″	643
2627	....	4 9 23.5	148 10 10	B; p L; p m E; s m b M to a round nucleus = ✱ 11 m........	519
2628	....	4 10 57.8	146 29 20	p B; R or l E; b M to an elongated nucleus	521
		60.1	29 42	p B; l E; g b M to an extended nucleus. A D ✱ precedes........	520
2629	....	4 11 30±	146 0 18	B; R; 40″........	521
2630	....	4 12 32.2	146 12 1	v B; R; g m b M; 60″ between 3 stars	520
		....	12 38	B; R; in a triangle formed by 3 stars	521
2631	....	4 13 7.6	140 34 40	v F; S; R; v g l b M; 20″	526
		8.0	34 35	F; R; 25″........	744
2632	....	4 14 0.5	135 26 23	p F; l E; g l b M; 25″ long.	805
		0.8	26 16	p F; p m E; g p m b M; 25″ l, 15″ br. [Min of R A by obs 15]......	654
2633	....	4 14 11.3	160 50 55	A star 7 m chief of a cluster 8th class—about 20 in number, loose and straggling.	513
2634	....	4 15 34.6	153 12 30	v B; L; m E; g m b M; r; 2′ l, 1′ br	808
		35.8	11 52	B; L; m E; v g p m b M; 90″ l, 40″ br; has a ✱ 14 m at the southern edge.	756
2635	Δ. 338??	4 16 11.1	145 20 39	B; v L; first v g then s, m b M to a stellar nucleus. Diameter in R A = 15ˢ. A star 11 m involved, n p, gives it a distorted appearance. A curious object.	520
		12.8	21 2	p B; L; R; v g, then p s, b M........	521
2636	....	4 16 17.9	138 39 43	v F; S; R; g l b M; 20″ (hazy)........	526
		....	....	Found in place and viewed past merid; not v F; S; R	744
2637	....	4 16 44.8	133 51 49	F; S; R; g b M; 20″........	752
2638	....	4 16 48.2	134 1 19	v F; S; R; 15″ g b M; has a double star n f........	804
2639	....	4 16 58.8	130 59 22	p F; S; R; 15″; has a ✱ 13 m, 1′ n f........	638
2640	....	4 18 37.7	147 22 7	p B; S; R; p g b M. Has a ✱ 10 m 60″ dist and one 14 m dist one radius of neb from its edge, both s f.	519
2641	....	4 19 25.7	141 59 22	nor v F; R; g p m b M; 20″........	807
		27.0	59 4	v F; S; R; p s l b M........	655
		27.1	59 39	v F; S; R; p g b M, dilute at the borders	525
2642	....	4 20 57.2	145 19 47	F; S; E; g b M	520
		58.1	20 8	F; S; l E; g l b M........	521
2643	....	4 21 59.4	132 31 47	p F; S; R; g b M a ✱ 12 m prec 2ˢ.0; pos from centre of neb = 287°.8	804
2644	....	4 22 26.8	117 5 2	not v F; p L; R; g b M. (N.B. Time of transit somewhat confusedly stated in MS., which renders a mistake of 10ˢ not improbable.) See the next observations.	643
		35.3	4 58	v v F; R; g b M; 15″	646
		35.1	4 36	p F; S; R; g l b M 15″........	511
2645	....	4 22 39.4	117 20 ±	v F; v S........	643
2646	....	4 23 33.5	138 11 9	v F; R; b M; 15″	805
2647	....	4 23 45.0	138 9 24	F; R; b M; 20″........	805
2648	....	4 23 55.6	145 24 16	B; m E; p L; p s m b M; 60″ l. The preceding of 2	520
		56.0	24 24	B; m E; s m b M; 60″; pos = 15°.0........	521
2649	....	4 24 8.3	145 26 25	e F; L; roundish undefined. The following of 2	520
		9.6	25 42	e F; p L; l E; the following of 2........	521
2650	....	4 27 21.8	134 4 54	p F; S; p s b M	639
		23.9	4 44	F; S; v l E; v l b M; 20″	752
		25.4	3 37	F; p m E; v g l b M; 20″........	804
2651	Δ. 339??	4 27 53.7	144 57 42	p B; L; m E; s b M; 3′ l, 2′ br; pos 105°.8........	521
		54.3	58 33	B; L; m E; first v g then v s, m b M to a nucleus 5″ in diameter; 3′ l; 1′ br.	520
2652	....	4 31 2.1	110 59 17	A nebula. No description	652
2653	....	4 31 36.7	162 11 55	v F; R; g l b M; 60″	523

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2654	II. 522 h. 326	4 32 30.4	98 56 6	F; R; g b M; 40″; near some small stars	758
2655	....	4 33 16.3	107 19 40	e F; v S; R; between 2 stars	651
2656	....	4 35 22.1	156 8 23	p L; p rich; irreg R cluster; p m comp M; 5′; stars 11 ..... 16 m....	517
2657	....	4 36 58.0	156 31 50	F; R; g b M; 30″	658
		60.9	31 27	p B; S; R; g b M; 15″	508
		64.0	30 56	v F; R; g b M; 30″	761
2658	....	4 38 30.2	131 48 31	F; p m E; g l b M; 40″	804
2659	....	4 38 39.1	131 50 20	v F; l E; g l b M; 20″	804
2660	....	4 38 43.3	159 8 37	F; R; g b M; 30″	523
2661	....	4 38 47.9	158 59 54	v F; S; R	653
		49.9	59 32	v F; S; R; g b M; 12″	508
		49.9	60 21	F; R; g b M; 35″	759
2662	....	4 38 58.0	160 55 1	p F; L; R; g v l b M; 2′ diam	523
		58.2	54 53	v F; L; R; v g l b M; 2½′ diam	509
		58.3	55 12	p F; L; l E; g b M	751
2663	....	4 41 5.4	135 5 26	e F; R; attached to a star 14 m	804
2664	....	4 42 13.3	156 7 25	e F; S; R	658
2665	Δ. 296 ? ?	4 43 2.8	149 33 33	B; L; p m E; s v m b M to a nucl; 2½′ l; 1½′ br; a ✻ 12 m involved..	519
		5.5	33 8	B; L; m E; first g, then p s m b M; 4′ l; 1½′ br	665
2666	....	4 43 29.2	122 15 14	p B; L; irreg R; surrounds a ✻ 12 m, touches two 11 m and has a fainter just at the edge.	645
		32.4	16 42	p B; L; irreg R; involves 4 stars, and is v g b about the chief of them ..	644
2667	....	4 43 46.8	160 7 20	v F; S; attached to a star 10 m. A doubtful object	523
2668	....	4 43 49.9	138 6 48	e e F; R; r, or else stars seen on it. Well defined (hazy)	526
		52.2	6 19	v F; S; R; very near a star 15 m	805
		52.4	7 5	F; R; r, or has some v F stars involved	744
——	Nubecula Major	4 44	160°45′..161°	Lower part of zone begins to be filled with the faint light of the Nubecula Major. At 4^h 47^m this light increases, and we are evidently on the skirts of the Nubecula. At 4^h 50^m; N P D = 160° 2′ stars from 12 to 15 m are now very numerous.	751
2669	....	4 44 26.0	159 7 48	v F; irreg R; 90″; r	653
2670	....	4 45 0.9	124 13 21	v F; R; g b M; 20″	662
		4.6	13 47	e F; R; v l b M	663
2671	....	4 45 48.7	150 5 11	B; R; first g, then p s l b M; 60″	756
		52.8	5 22	v F; p L; R; g b M; 50″	519
		55.4	5 16	p B; irreg R; p g m b M; 60″	524
2672	....	4 48 31.5	159 37 57	F; S; R	523
		35.3	38 44	F; S; R. (Sky hazy.)	509
2673	....	4 48 40.0	159 40 7	F; S; R	523
		41.3	40 13	F; S; R. (Sky hazy.)	509
2674	....	4 48 51.4	158 30 31	v F; E; v l b M	508
2675	....	4 49 5.9	158 50 41	p B; R; v g l b M; 40″	508
		7.6	50 42	⊕. p B; R; g l b M; 90″. Resolved. With the left eye I see the stars. (N. B. The degree is 159 in the original, but this is a manifest error, the zone swept not extending so far as 159.50.)	653
		8.0	51 4	p B; p L; R; g b M; 50″	759
		8.8	49 51	p B; R; g l b M; 70″. Has a ✻ 10 m 3′ s f	522
		9.7	50 39	p B; L; R; g l b M; 80″	512
2676	....	4 49 14.1	120 9 23	F; S; R; g l b M; 20″. Has a ✻ 9′ m s f, 90″ dist	645
		14.8	8 42	p F; l E. Has a ✻ 10′ m s f dist 60″	644
		17.0	9 21	F; S; R; 20″. A star 10 m s f and a small D ✻ s p. (N. B. The R A is 4.50 17.0 by the original obs.; but this must be presumed erroneous, as the three observations manifestly refer to the same nebula.)	511
2677	....	4 49 51.1	159 23 46	p B; R; g l b M; 60″; r	523

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2678	....	4 50 21.5	150 1 6	F; L; R; v l b M; 90″; very dilute at borders. A star 9′ m s f almost involved.	519
		24.0	0 51	F; p L; R; v g l b M; 50″. Has a very delicate and beautiful 1st class double star attached.	524
2679	....	4 50 25.9	143 38 10	B; S; R; p m b M; 20″	520
		28.7	38 10	p B; S; R; g p m b M; 15″	807
		30.1	38 14	v F; S; R; p s b M; 20″; very dilute at borders	525
2680	Δ. 73 ?	4 50 40.3	160 8 32	A v F, S, cluster	751
2681	....	4 50 58.6	110 37 36	p F; p L; R; g l b M; 50″	652
2682	....	4 50 59.0	153 16 25	F; R; v g l b M; 40″	808
2683	....	4 51 5.4	160 2 2	e F; S; E; 40″ l; r	751
		7.6	2 26	B; R; b M; 90″	523
2684	Δ. 76 ?	4 51 56.0	160 15 43	⊕; B; S; R; r	748
		61.4	16 12	⊕; B; irreg R; g b M. Resolved into st 14 m, with outliers as far as 4′ diam.	751
2685	....	4 51 57.2	159 42 46	A p B, S, cluster	523
2686	....	4 51 58.5	157 12 0	v B; S; l E; p s b M. Double or extended wedge-shaped	653
		58.9	11 11	v B; E or binuclear; m b M; 40″ l. The s p of two	522
		59.0	12 45	v B; S; p m E	657
		59.1	11 12	v B; S; E; b M; 15″. Has another v F neb nearly north	508
		60.2	12 7	v B; R with an appendage; g m b M; 30″	760
2687	....	4 51 59.1	157 10 ±	v F; the n f of two	508
		62.0	11 40	e F; R; p L; the 2nd of 2, making a lozenge with the other, and two stars.	658
		62.4	10 31	v F; S; R; s b M; the n f of two	522
2688	....	4 52 18.8	157 19 46	F; R; b M; 20″	653
		19.7	19 31	F; R; b M	508
		20.6	19 36	p F; R; v g l b M; 60″	760
2689	....	4 52 51.4	159 40 55	p B; S. A knot of clustering stars	523
		51.6	39 47	F; S; R. (Sky hazy.)	509
		55.2	39 36	The second of a series of clustering patches	748
2690	....	4 53 8.8	159 37 26	The third of a series of clustering patches. Oval	748
		12.6	36 43	A rather poor irreg R cluster. (Sky hazy.)	509
		13.5	36 55	A cluster, p B; p m E; 3′ l, 90″ br; stars 12 m	523
2691	....	4 53 21.4	157 11 1	A double star, the chief of a p Rich, p L, cluster of loosely scattered st; l comp M; 8′; stars 11 .... 15 m.	522
		21.5	11 45	A poor loose cluster 8′ diam; stars 10 .... 15 m; chief D ∗ taken	653
		21.7	11 40	A double star, the chief of a poor loose cl 3 or 4′ diam	658
2692	....	4 53 37.9	116 17 25	v F; v L; v m E; v g v l b M; 4′ l, 2½′ br	646
2693	....	4 53 47.0	156 56 36	e F; R; g b M; 40″. A very starry field follows this, and hereabouts may be said to commence the denser part of the Nubecula Major.	761
2694	....	4 53 50.3	158 55 9	A S double ∗ 1st class in centre of a S. R. neb	512
		50.3	55 20	v S; R; 12″	759
2695	....	4 54 16.2	159 2 8	p B; L; R; g m b M	512
2696	....	4 54 18.2	157 21 31	F; v S; R; has two or three stars appended	508
		....	22 4	p B; S; R; has two stars appended forming an arc with the nebula. (N.B. This obs makes the R A h. 54.2.1, but having been made in a hurried and somewhat irregular manner when the nebula was leaving the field, it is most likely that the sliding eyepiece was not brought fully up to its bearing; a source of error which has on more than one occasion produced embarrassment. The R A adopted is liable to no objection.)	760
2697	....	4 54 23.3	158 20 11	B; R; r	759
2698	....	4 54 42±	159 27 ..	v F; S; the first of a trapezium of 4 neb. Place estimated from those of the 2nd and 4th.	748

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2699	Δ. 114	4 54 58.8	159 28 0	R; g b M; 2′ (thick haze)	509
		60.5	28 14	B; R; resolvable; No. 2 in a group of four forming a sort of lozenge	748
2700	....	4 55 4.4	128 57 46	v F; p L; v g l b M; 90″	801
2701	....	4 55 11.3	157 26 29	A star 9 m in a faint cluster of 6th class	760
		14.0	26 10	A ✻ 9 m in the centre of a poor cluster of v S stars 4′ diam	508
2702	....	4 55 18±	159 26 ..	F; S; No. 3 in a group of 4. Place estimated from No. 2	748
2703	....	4 55 21.5	158 27 14	v F; R; the preceding of two in the field	759
2704	....	4 55 24.0	159 27 54	p B; v S; R; No. 4 in a group of 4	748
2705	....	4 55 33.1	160 4 47	e F; irreg R; 2′	751
2706	Δ. 167	4 55 41.5	158 28 29	v B; R; g b M; 60″. The following of two in the field	759
2707	....	4 55 48.3	159 30 9	v F; S; R	748
2708	....	4 55 54.3	160 42 37	F; S; R; 20″. Has a ✻ 13 m close to edge (about 45° sf by diag.)	751
2709	....	4 56 13.0	156 46 38	A very faint small nebula with 3 v S st involved; place deduced not from a sweep but from a drawing carefully made of its configuration with the neighbouring nebula, especially of the cluster *f* 653,14. See fig. 3. Pl. III.	
2710	....	4 56 14.6	156 43 49	Chief ✻ 9′ m in a L loose cluster	653
		15.0	43 56	Place of a very close double star in a cluster class 6	761
		19.1	43 45	A cluster, 6th class. (Plate III. fig. 3)	658
2711	....	4 56 22.1	156 40 19	A v B, v L neb with stars (the chief of which in the anterior part of the neb taken) of a crooked rounded oblong shape. A fine object. See fig. 3. Pl. III.	653
		23.6	40 5	B; 4′ l; 2½′ br	658
		28.3	39 31	v B; v L; m E; stars seen	522
		30.5	39 46	v B; v L; irreg oval figure with stars in it	761
		39.4	40 10	v B; v L; irregularly extended, irresolvable but thickly dotted with many distinct stars. (N.B. The discordance in R A arises in part from the great magnitude and irregular shape of the object, and the want of a natural centre of reference: partly, however, to the state of the reductions in this sweep which are not very satisfactory.)	508
2712	....	4 56 32.0	152 17 4	F; S; R; b M; 15″	756
		33.6	16 46	v F; S; R; g l b M; 15″	524
2713	....	4 56 44.8	157 57 23	v F; S; R; 15″. The zone here is full of grouping and clustering stars ..	760
2714	III. 500 h. 345	4 57 10.1	99 23 10	p B; R; g b M; It is visible in strong ☽ and is much brighter than II. 522 or III. 399.	758
2715	Δ. 169	4 57 14.1	158 40 17	Cluster of 6th class; p Rich; L; irreg fig; b M; st 11 .... 18; fine object.	512
		51.2	40 31	A star 9 m the chief of a cluster of 6th class 4′ in diam; nebulous. The most condensed part is 1′ south of the stars. (N.B. In the former obs it does not appear that this particular star was taken, nor what centre of reference was fixed upon.)	759
2716	....	4 57 24.5	156 42 46	p B; p L; with one conspicuous star. See fig. 3. Pl. III.	761
		26.2	42 10	A star 10 m involved in F neb 2′ diameter	658
		27.1	43 3	A star in the centre of a B, L, R nebula	653
		27.5	42 11	v B; v s m b M to a ✻ 10 m which is double or triple. Other clusters and nebulæ in field.	522
		29.2	43 0	B; irreg R; 2′; has a ✻ 10 m in centre	508
2717	....	4 57 27.7	160 28 43	F; S; R; g b M; 25″	523
		35.2	29 17	v F; R; 30″. Taken at leaving the field, which, in so faint an object, is a source of uncertainty in R A.	751
2718	....	4 57 27.8	158 30 47	F; R; g b M; 20″	759
2719	....	4 57 32.7	102 6 40	p B; p L; irreg R; or v l E; v g b M; 80″ among p B st	757
2720	....	4 57 32.7	153 33 25	v F; m E; g l b M; 25″ l; in field with many B and 1 v B ✻ 7′ m n p the neb.	808
2721	....	4 57 47.1	156 36 41	p F; p L; irreg R with 2 or 3 B st	761
2722	....	4 58 0.5	159 48 19	An irreg R, comp cluster, b M; 40″ diam	656
		1.5	48 57	p B; S; R; 40″; r; preceded by a hook of stars 12 m	523
		2.3	48 57	p F; R; r; among numberless stars	748

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2723	....	4 58 11.4	157 29 55	p F; R; p g b M	658
		11.7	29 51	v b; S; R; s m b M; 20″ (evidently better seen)	760
		12.2	29 36	B; R or oblong; pretty evidently a double star with a nebula about it	512
2724	....	4 58 20.4	156 40 41	v F; S; R; g b M	761
2725	....	4 58 36.3	160 41 7	v v F; irreg R; 2′	751
2726	....	4 58 38.1	156 14 18	p B; L; R; g b M; 2′	653
		40.7	14 15	B; L; R; v g p m b M; r; 3′	808
2727	....	4 58 54.9	159 38 40	B; R; p m b M; 35″; r	657
		55.6	39 12	⊕; B; S; R; r	748
2728	....	4 59 15.1	164 32 25	e F; E; attached to and following a D * (9 = 9 m)	514
2729	....	4 59 20.6	157 59 14	v B; R; v s m b M; 30″	759
		25.1	59 40	v B; E; S. Stellar, like a * 9 m blurred	658
		26.5	60 6	v B; S; R; s v m b M; 15″	760
2730	Δ. 531?	4 59 20.7	128 13 41	B; v L; m E; regular elliptic; res. I see several small st in it	801
		23.8	14 36	v B; v L; m E; g l b M; 5′ l, 2′ br; pos 314° stars seen in it. Visible with ☾ and lamp illumination.	661
		....	14 ±	v B; v L; v m E; g b M; 4′ l. Taken as Δ 531 but too late for transit, the observation having been missed by relying on Mr. Dunlop's place.	659
2731	....	4 59 47.0	156 5 15	p Rich cl of S stars which fills field. In northern edge of the Nubecula Major.	808
2732	....	5 0 3.1	122 11 11	p B; p m E; g p m b M; has a * 13 m following	645
2733	....	5 0 25.3	162 8 14	v F; R; v g l b M; 40″	656
2734	....	5 0 36.5	160 24 25	e F; R; 25″	657
2735	....	5 0 37.3	151 21 58	p B; p m E; v g l b M; 40″ l	756
		42.1	22 11	F; p m E; g b M; 70″ l 25″ br	524
2736	....	5 0 46.2	159 48 11	v F; S; R; g l b M; 30″ insulated	523
		52.2	47 43	p B; R; b M; 60″	513
2737	....	5 1 5.2	139 48 18	F; S; R; v g l b M; query whether a * 11.12 m near it s f be not also nebulous.	526
2738	Δ. 81	5 1 12.9	160 2 12	F; p L; l E; 2′	751
2739	....	5 1 45.3	159 50 40	F; R; g b M; 40″	657
		45.8	51 14	F; R; g b M; 90″	656
		48.1	51 11	F; S; R; g l b M; 45″. The preceding of two in the field	523
		50.1	50 53	B; L; R; v g b M; 2½′	513
2740	Δ. 549	5 1 48.0	127 44 14	B; E; 3′ l, 90″ br; in a field strongly illuminated by the ☾ in her first quarter.	661
		....	46 ±	B; L; l E; first g, then p s m b M. Transit missed, P D very rough	659
2741	Δ. 233?	5 1 56.2	156 20 56	B; S; R; p s b M	512
		57.0	20 46	v B; v S; v s v m b M; a condensed knot of stars, two of which (one on either side) are exterior.	761
		58.3	20 11	B; S; R; s b M; 25″; has 2 st very near, one n p, one s f	522
		59.2	20 15	A v S compact cl of st 11 m with (?) nebulosity; 20″	508
		59.7	20 48	B; S; R; has * 12 m n p	653
2742	....	5 2 1.0	159 19 14	F (?); R; b M. (Thick haze in sky)	509
		3.4	19 40	F; S; R; 30″	748
2743	....	5 2 6.3	119 29 44:	p F; S; l E the preceding of 2	643
		7 ±	31 ±	v F; E; place roughly deduced from that of its companion	511
2744	....	5 2 17.0	119 28 51	F; S; R; g l b M; 15″ the following of 2	511
		17.3	28 14	F; S; R; the following of 2	643
2745	....	5 2 36.3	158 13 47	p b; L; g b M; 3′	759
2746	Δ. 235	5 3 5.1	156 37 1	Nebula; no description but that it has a ⊕ following it	761
		5.4	36 30	p F; R; l b M; 25″	658
		6.5	36 55	e F; S; R; 15″ precedes a globular cluster	512
		7.5	36 31	v F; R; l b M; 40″	522
		7.9	36 38	F; S; R	653

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2747	....	5 3 18.1	159 51 40	p F; S; R; g b M; 40″ the second of two in field	523
2748	....	5 3 55.2	157 32 15	v F; R; a nebulous knot in the s p part of a cluster	760
		58.9	31 59	The southern of two nebulæ in the same cluster of stars	508
2749	Δ. 236	5 3 58.5	156 39 35	⊕; B; Rich, compact; v m compressed	512
		59.5	39 15	v B; S; R cluster of distinct stars; m b M; 2′ diam	508
		59.6	39 27	v B; R; g m b M; 30″; has several small st near it	653
		59.6	39 40	⊕; v B; L; R; g p m b M; 100″; resolved. I see the stars	658
		60.3	39 31	v B; R; p s m b M; 2′ diam; resolved. The stars well seen	522
		60.5	39 26	⊕; v B; S; R; v m b M; resolved; has several outliers	761
2750	....	5 4 0.1	157 29 28	v F; R; another nebulous knot in the cluster	760
2751	....	5 4 10.2	127 11 38	v F; v m E; a long ray through a star 11 m	801
2752	....	5 4 12.4	160 33 10	v F; S; R; r	657
2753	....	5 4 15.3	160 50 57	F; R; b M	751
		15.5	51 2	p F; v S; R; v l b M among many stars	513
2754	....	5 4 23.6	157 29 13	A p L, Rich, 6th class cluster; irreg fig; in radiating streaks. Place that of a ⁎ 10 m (one of 3 such). It is within this cluster that the two nebulæ No. 2748 and No. 2750 occur.	760
2755	....	5 4 24.3	149 56 55	v F; v m E; g v l b M; 90″ l	756
		32.3	56 16	v F; v m E; 2′ l, 20″ br; pos = 162.0. I prefer the former R A as the Zeros in ʃ 756 are more numerous than in ʃ 524, and the extrameridian correction evanescent in the former sweep, whereas in the latter it amounts to several seconds.	524
2756	....	5 4 44.8	156 26 10	v F; 20″; the preceding of 2	658
2757	....	5 5 7.7	156 27 20	v F; 20″; the following of 2	658
2758	....	5 5 9.7	160 34 17	The most compressed part of a p F; L; branching cl of stars 12 . . . 15 m	751
2759	Δ. 246	5 5 26.2	155 8 18	B; L; R; g l b M; 90″	518
		28.8	9 45	B; R; r with left eye; 2½′ diam	808
2760	....	5 5 28.0	158 16 37	F; R; 60″; r	653
2761	....	5 5 28.0	159 36 4	v F; S; R; g b M; 20″	748
		28.4	36 44	F; S; R; 20″; the first of 3	523
		28.5	37 19	F; the preceding of 3	656
		31.9	36 45	F; S; R; 15″; the preceding of 3	657
2762	....	5 5 43.5	159 34 8	F; p L; R; g l b M; 80″	748
		44.5	34 9	F; S; R; 25″; the second of 3	523
		47.5::	36 50::	The second of 3. Place roughly estimated from a diagram made at the time from those of the others.	656
		48.5	34 5	F; St; R; 20″; the second of 2	657
2763	....	5 6 14.2	159 37 44	v B; S; R; p m b M; 40″; the last of 3	523
		16.0	37 28	B; R; g b M; 60″	748
		16.0	37 34	v B; R; p g v m b M; 60″; the following of 3	656
		18.5	37 35	B; R; g m b M; 30″; the following of 3	657
2764	....	5 6 14.7	159 26 17	B; v v S; l E; uniform in light; 10″	748
2765	....	5 6 16.6	160 57 27	v F; p L; runs into and forms the first mass of a series of clustering groups	751
2766	....	5 6 20.8	158 51 1	The first nucleus of a clustering group of mixed stars and neb	759
		....	....	Seen. No place or description	512
2767	B. 895	5 6 40.2	158 39 48	A star 7′ m, the chief of a large very loose clustering mass	759
2768	Δ. 170?	5 6 45.7	158 50 54	p B; irreg fig; the following of 2 in field together	512
		47.8	51 1	The second nucleus of a binuclear clustering group of mixed nebula and stars	759
2769	....	5 6 47.7	160 56 11	The last of three clustering groups (hazy)	509
		49.0	56 22	The most condensed part of a large rich cluster of scattered stars which more than fills field.	513
2770	....	5 7 47.5	160 45 1	The general middle of the same cluster	513
		68.1	48 55	A star 9 m the second in magnitude and near the centre of clustering groups which run together and form a cluster which fills the whole field. v l comp M; St 11 . . . . . 16 m	751

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2771	....	5 7 13.5	161 58 26	F; R; b M; r. Hardly visible through a thick haze. The observation makes the R A 6^m 13.5, but this is impossible from the context. It *may* be 8^m.	509
2772	....	5 7 20.2	157 29 20	e F; the preceding of 2	658
		25.1	29 46	v F; R; the preceding of 2	760
2773	....	5 7 32.9	157 32 31	F; R. [There has been most probably a mistake of 10^s in reading or registering the chronometer committed here.]	653
		39.6	31 36	p F; R; g b M; 25″; has 2 s t 12 m to the north	522
		39.6	32 11	p B; R; g b M; 40″; the following of 2	760
		42.3	32 9	p B; R; g b M; 60″	508
		....	32 40	F; R; b M; the following of 2. [The seconds of R A come out on reduction 48.3, but the nebula was taken on leaving the field, and the observation is noted as unsatisfactory in the MS.]	658
2774	....	5 7 47.6	157 39 31	p F; v L; R; v g b M; r; 3′	522
		47.9	40 9	B; L; R; g b M; 3′	508
		47.9	40 21	p B; L; R; g l b M; 2′	653
		....	40 55	p F; v L; R; v g b M; 3′; a fine nebula. [The R A comes out 7^m $27^s.5$, but this cannot be admitted. The nebula was taken at leaving the field, and no doubt the slider of the eye-piece could not have been brought up to its contact. The P D, however, is good.]	760
2775	....	5 8 5.8	159 10 59	B; E; 30″; has a double star in the centre (Pl. VI., fig. 11)	656
		7.6	11 21	B; S; R; g b M; 15″	748
2776	....	5 8 29.4	161 24 8	The first and brightest star, 9 m, of a cluster of loosely scattered stars	514
2777	Δ. 508	5 8 29.7	130 14 47	Superb ⊕; v B; R; first v g, then s v m b M; 4′; resolved, the stars barely visible in strong twilight.	772
		31.7	14 12	Superb ⊕; all resolved into stars 14^m; v s m b M to a blaze or nucleus of light; diam in R A = 15 seconds of time. Difference of left and right eyes in resolving this cluster very remarkable. Returning from the left to the right eye, the object (in comparison) appears as if glazed over with a kind of dull film.	638
		....	15 ±	v B; R; v s v m b M; 3′; all clearly resolved into stars from 14 to 16 m except at the centre, where they are massed together into a blaze of light.	754
2778	....	5 9 18.5	156 30 56	v F; l E; g l b M; 25″	761
2779	....	5 9 19.5	147 35 49	F; m E; v g v l b M	665
		20.3	35 50	F; E; towards a star 11 m; g l b M 30″; has another ✻ 9 m, n........	664
		23.2	35 50	F; S; m E; pos 45° n f to s p. Has a ✻ 11 m n f	519
2780	Δ. 170 or 172	5 9 30.6	158 57 48	⊕; a fine large cluster of st = 13 m; m b M. [The preceding of 3 objects, all of which were taken, and the R A therefore probably hurried and somewhat anticipated.]	523
		33.2	57 49	⊕; B; R; g b M; 3′ diam; resolved into stars	656
		34.6	58 2	v B; L; l E; v m comp M; 3′; r	759
		35.4	58 20	v B; L; oval; resolved	748
		36.7	58 9	p B; S; R; a cluster of s t 12 m; diam 1′	508
		36.7	57 48	⊕; v B; v m comp 3′ diam	512
2781	....	5 9 44.4	157 59 30	p F; R; g l b M; 30″	658
		44.8	58 58	F; R; v g l b M; 90″	759
		46.0	58 51	F; R; g b M; 2′	522
		48.5	59 23	p F; p L; R; v g b M; 90″	760
2782	....	5 10 7.5	159 3 21	B; S; R; 35″	653
		11.5	3 0	B; E; g b M; 2′; r. The second of 3 objects	657
		11.6	3 28	⊕; B; S; R; 25″; r	523
		12.4	3 22	A cluster nebula; S; R; p B; 40″	512
		17.7	3 45	F; R; g b M; 40″	748
2783	....	5 10 17.9	159 2 49	A v B; L, Round cluster of stars 12 m, 5′ diameter. (N. B. This obs. must refer to the general cluster in which the former is situated as a nebulous-looking knot — a combination of the most ordinary occurrence in the Nubecula Major, though very rare in other parts of the heavens.)	508

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2784	....	5 10 31.5	159 19 40	v B; R; g m b M; 50″	657
		31.5	20 41	B; R; g b M; 12 seconds diam in R A in time. Has a bright star to s	509
		32.1	20 6	B; p L; R; g b M; 90″	513
2785	....	5 10 41.7	159 6 31	Centre of a L; oval; r; neb 3′ or 4′ l, $2\frac{1}{2}$′ br	653
		43.0	6 10	A L, irregularly E cluster and neb. Has 2 bright neb n p	509
		44.8	4 57	The preceding part of a nebulous cl of irreg fig	523
		46.5	6 1	B; L; irreg fig; Binuclear; 3′ l, 2′ br. The s f of 3	513
		49.5	5 19	A bright cl of irregular figure	508
		51.9	6 24	Two oval nebulæ joining	748
		53.6	5 50	An irregular cluster with a nebulous knot.—[N.B. *This object, by diagrams, made in several of the observations, appears to consist of a resolvable and irresolvable portion, the general form being that of a somewhat crooked oblong extended from* n p *to* s f *at an angle of* 60 *or* 70° *with the parallel, the northern end being nebulous, the southern starry. This anomalous form and constitution will serve to explain the apparent disagreement of these descriptions and places.*]	657
2786	....	5 10 52.8	155 26 54	F; S; R; v g b M; 20″; has a ∗ 7 m n f, dist 6′	518
2787	Δ. 172?	5 11 31.1	158 57 45	F; R; v g b M; 60″	759
2788	....	5 11 52.1	174 15 5	p F; L; irreg R; v g b M; r; 3′ diam. (R A open to much error for want of zero stars to be depended on.)	668
2789	....	5 12 3.3	156 20 50	v F; R; 30″	538
2790	....	5 12 23.5	160 59 2	e F; R; g v l b M; 90″	751
2791	Δ. 172 or 173?	5 12 27.0	158 55 35	v B; v S; stellar; has a ∗ n p	653
		28.0	55 26	B; v S; R; r; 15″; has a small star very near the edge	523
		28.4	55 35	a v B; v S; knot of stars	657
		29.5	55 3	v B; S; R; 20″	509
		29.8	55 36	B; S; R	759
2792	....	5 12 59.5	157 49 11	F; R; b M; 60″	522
		60.8	49 25	F; irreg R; r; query, if not a knot of v S stars	658
2793	Δ. 247 or 248	5 13 5.7	155 39 37	v B; L; R; v g m b M; 2′; r	512
2794	Δ. 173??	5 13 14.8	158 57 31	v F; p L; R; v g l b M; 45″	523
		15.1	58 4	v F; R; 40″	759
		16.9	57 25	v F; R; 20″	657
——	....	5 13	159	The southern part of the field is here illuminated by the faint light of the Nubecula Major.	
2795	....	5 13 25.0	156 29 6	e F; p L; R; 2′. (Sky dull)	761
2796	....	5 13 28.9	154 8 48	p F; p L; R; v g l b M; 80″	515
		31.5	8 27	p B; R; g b M; 30″	518
2797	....	5 13 29.9	122 19 42	v F; L; R; v g v l b M; 2′; has a ∗ 12ˢ prec and 3′ n	644
——	....	5 13 55.2	157 22 33	The star (L C 409, B 922 θ Doradus of the Brisbane Catalogue) marks the northern limit, and the commencement in R A or nearly so of a great irregular series of clusters, more or less connected by scattered stars.	760
2798	Δ. 210	5 13 58.4	157 34 10	Cluster of 7th class; a fine L cluster of sc st which fills the field. The point taken is in the middle of 3 groups in the most condensed part.	658
		63.9	34 3	The first of the series of clusters which extends northwards as far as B 922.	760
2799	....	5 14 5.6::	159 16 38	B; S; R; l b M; in the general irresolvable illumination of the Nubecula Major. Beyond the limit of the sweep, and the right ascension in consequence liable to error; [besides which, the reductions of this sweep run badly.]	538
		15.7	18 21	B; S; R; g l b M; 25″	513
2800	....	5 14 7.9	157 39 23	The second of a series of clusters which extend northwards as far as B 922	760
		9.4	38 9	A poor cluster; the southern of three or four	508
2801	....	5 14 11.4	157 31 23	The third of a series of clusters extending to B 922	760

No.	Synon.	R. A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2802	....	5 14 19.9	159 30 25	p B; S; R; insulated in the recess of an arc-formed nebulous cluster. (See plate III, fig. 6, for this and several following objects.)	523
		20.1	30 13	B; R; g b M; the preceding nebula	509
		20.9	30 22	p B; R; g b M; 2′. An arc of faint stars connects it with another	748
		21.1	29 50	p F; R; g b M; insulated within an arc	657
2803	....	5 14 22.6	159 33 55	The south preceding of two, forming a binuclear nebula at the southern extremity of an arc-formed cluster of stars.	657
2804	....	5 14 27.1	159 32 45	The north following of two, forming a binuclear nebula at the southern extremity of an arc-formed cluster.	657
		27.9	32 55	p B; r; the most compressed part of an irregularly figured cluster, whose outliers form an arc.	523
		30.7	33 2	The second, or northern nucleus of an irregular binuclear nebula which terminates, to the south, an arc-formed cluster.	748
		31.1	33 22	B; irreg R; (the following of two very close) connected by an arc-formed cluster with another (No. 28 of same sweep).	509
2805	....	5 14 32.0	159 33 50	A 3rd and v F nucleus of the nebular group at the southern extremity of the arc-formed cluster. From figure of Jan. 17, 1838.	....
2806	II. 289 h. 352	5 14 39.0	101 40 13	p b; R; g b M. Very visible in strong ☾ light	758
2807	....	5 14 45.7	160 39 52	v F; l E; g v l b M; r. (N. B. The Nubecula Major is here very poor, and hardly anything of it seen.)	751
2808	....	5 14 51.0	159 33 46	A fourth nucleus at the southern end of the arc-formed nebula and cluster, as laid down in the figure of Jan. 17, 1838. Pl. III. fig. 6.	....
2809	....	5 15 13.0	156 18 31	p F; R; v g v l b M; 3′ diam mottled (resolvable)	761
2810	....	5 15 15.7	159 29 0	v F; follows a double star. An outlier of the arc-formed nebula and cluster. Laid down in drawing Jan. 17, 1838, whence also its place. See Plate III. fig. 6.	....
2811	....	5 15 17.1	125 53 26	A large scattered cluster, which more than fills the field. Stars 10 ... 12 m. Place that of a double star, the chief star.	661
2812	....	5 15 42.5	156 20 41	e F; 2′ diam	761
2813	....	5 15 51.9	156 30 11	v F; v S; R; has a ✻ p 25″ dist	512
2814	....	5 15 58.3	159 9 21	p B; R; b M; 15″	538
2815	....	5 16 24.4	155 8 55	v F; p L; l E in parallel; v g l b M; 2′ l; 90″ br	515
		24.5	8 20	p F; p L; E in parallel; 90″, 50″; has a ✻ or two in it	518
2816	....	5 16 36.3	162 15 51	v F; S; R; g l b M	514
2817	....	5 17 2.5	157 30 25	p B; R; g l b M; 40″	538
		4.9	30 8	p F; p L; R; g l b M; 40″	508
		6.7	30 35	F; p L; R; g l b M; 70″	658
		9.1	30 49	p F; R; v g b M; 80″	760
2818	....	5 17 10.4	159 38 35	F; R; g b M; 80″; r. On a ground of small stars	513
2819	....	5 17 46.2	153 11 41	p B; irreg R; g b M; 25″. Among many st, one = 7′ m, n p	524
		47.6	12 28	e F; p L; l E; v g v l b M	515
2820	....	5 17 47.4	157 37 11	e F; S; R	538
2821	....	5 18 3.8	158 2 57	F; R; v g b M; 40″; 3 stars 10′m precede	759
2822	Δ. 124 ?	5 18 6.0	159 49 35	F; R; 40″	513
2823	....	5 18 11.8	156 47 55	p B; R; b M; 60″	658
		13.1	48 16	p B; S; R; b M; 15″	512
		13.3	47 44	L; R; b M	653
		15.0	47 46	⊕; p B; R; p s m b M; 2′ diam. Resolved	761
		15.3	47 31	p B; S; R; g p m b M; 40″	522
2824	....	5 18 16.9	158 45 56	A star 7 m. The most southern and largest of a L, brilliant but poor cluster which fills the field. Stars 8, 9 .... 12 m.	759
2825	....	5 18 33.3	159 30 19	v B; R; g m b M; 25″	656
		34.0	30 24	B; R; g b M; 40″	523
		35.4	30 10	B; R; g m b M; 25″	657
		36.5	30 55	v B; R; g b M; 40″; r	748
		37.0	30 37	v B; S; R; g b M; 30″	509

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
——	....	5 18 19	160..161	Sky black in all the southern part of the degree swept, but the 5′ at the upper end (160° 2′...160° 7′) marks the edge of the nebulous light of the Nubecula Major.	751
2826	....	5 19 13.5	156 55 51	F; R; g b M; 30″. Among many stars	522
2827	Δ. 129	5 19 18.0	159 23 2	Fine cluster. Irreg fig. The chief nucleus (which seems to be a close double star, 9 m) taken.	523
		19.6	23 29	The most condensed knot (= 12″) in a pretty rich L, s c, cl	656
		20.3	22 58	The brightest v S knot in a L irreg cl of st 11 m 16 n	748
		33.9	23 45	p rich L cluster 10′ diam. It has in it a close triple star, easily taken for a nebulous knot. (N. B. This is doubtless the knot taken in the three foregoing observations, but it does not appear what point in the cluster was taken in this obs; probably the general middle.)	657
2828	....	5 19 37.2	156 58 8	e F; p L. (Possibly the same with No. 2826, but the nebulæ are so crowded that they may with equal probability be different ones.)	760
2829	....	5 19 51.1	159 34 47	B; S; R; g b M; 25″; r	748
		53.6	34 15	B; S; R; v g v m b M; 15″....................................	657
		53.8	34 37	v B; v S; R; g b M; 20″......................................	509
2830	....	5 20 0.7	161 25 57	v F; L; irreg R; 3′..	509
		0.8	25 0	F; p L; irreg fig; r; 2′ l, 90″ br	513
2831	....	5 20 4.7	159 10 0	v F; L; R; g v l b M; 60″	657
2832	....	5 20 16.0	157 2 41	Cluster, 6th class; e F; L; irreg R; 4′ diam. Resolved into S st with nebulous light.	761
2833	....	5 20 32.0	156 56 5	p B; R; g l b M; 40″	538
		32.2	56 38	p L; b M. Seen through cloud..................................	653
		32.5	56 41	p F; R; g l b M; 2′	761
		33.8	55 58	p B; S; R; v g b M; 20″.......................................	508
		34.3	56 47	p F; R; g b M; 60″	760
		34.5	56 35	p B; R; b M; 45″..	658
		34.7	56 34	p B; R; p m b M. (In the body of the Nubecula Major.)	512
2834	....	5 20 49.7	159 56 52	v F; oval; r; 40″...	751
2835	....	5 21 1.5	155 38 40	v F; R; 30″. A faint and poor cluster precedes.....................	515
2836	....	5 21 12.5	136 52 52	v F; S; R; g l b M; 15″; has 4 B st prec..........................	527
		13.4	52 37	B; R; first g, then s b M; a group of B st prec.....................	805
2837	....	5 21 18.8	156 1 58	Cluster 8th class; poor; sc st; a ✻ 10 m the chief, in southern part taken	515
2838	....	5 21 36.7 :	159 42 0	p F; irreg R; g b M. (*See remark on the next neb.*)	748
		52.1	41 35	p B; R; 60″. Situated in the main body of the Nubecula Major........	509
		56.5	41 0	p B; p L; irreg R; r. Field full of light, consisting partly of stars, and partly of resolvable nebula.	513
2839	Δ. 131	5 21 57.1 :	159 38 50	v F; R; g b M. Field full of the nebulous light of the greater Nubecula. [NOTE.—*As it is hardly possible, without some perceptible slip of the apparatus, to make so great an error in P D, in an object of this nature, as this observation would imply, I cannot help supposing that an error of* 20ˢ ± *has been committed in R A, and that the places of the nebulæ ſ* 748, *Nos.* 25 *and* 26, *should stand as follows:*—748, 25—*R A* 5 21 56.7, *P D* 159 42.0; *and* 748, 26—*R A* 5 22 17.1, *N P D* 159 38.50. *This would reconcile everything. Now both these nebulæ were observed in quick succession in this ſ at leaving the field, where there is always a liability to an anticipation of the R A, from the sliding eye-piece not being urged up to full contact; and the quantity in question (at this P D) does not exceed what might very well arise from that cause.*]	748
		74.4	38 21	p B, R; 60″. Situate in the main body of the Nubecula Major	509
2840	....	5 22 7.8	158 5 13	F. The preceding nucleus of the compound nebula figured in fig. 2, Pl. III. Place by Δ R A and P D, from the chief nucleus measured on diagram.	....
2841	....	5 22 10.8	156 17 38	A double neb; pos. 260°; dist 80″. The first p B; S; R; 30″. The second e F; R; almost stellar.	538
		10.8	18 25	p F; irreg R; b M; 25″..	658
		12.0	18 41	p B; R; p s b M	761
		14.7	17 48	B; e S; b M; 10″	508
		15.1	18 1	p B; S; R; s v m b M, to a ✻; 30″	522

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2842	....	5 22 27.2	158 4 31	The 2nd nucleus of the composite nebula of fig. 2, Pl. III., from diagram..	....
2843	....	5 22 28.6	158 6 47	F; S; R. The third of a group of 4 nebulæ connected by stars	538
		29.8	6 49	The first bright nebulous head of a large beautiful irregular cluster of resolved stars.	759
		32.0	7 2	The second nebula of a group of three..............................	653
		33.5	7 13	B; S; R. One of the chief nuclei or knots of a large irregular cluster nebula. (See remarks on this nebula further on, and refer to figure 2, Pl. III.)	512
——	....	5 22 35.8	158 4 3	Hereabouts may be placed the general middle of the group of 3 nebulæ referred to in No. 31, ƒ 653.	653
2844	Δ. 175	5 22 45.8	158 7 52	The second of the two nebulous heads of the cluster referred to in No. 36 of this ƒ.	759
		46.6	7 39	The last of 3 nebulæ in a zig-zag formed cluster........................	656
		46.9	8 7	p B; S; R. The 4th of a group of 4 connected by stars, &c...........	538
		48.0	7 52	The third nebula in a group of 3	653
		49.5	8 8	p B; S; R. Another chief nucleus or knot of the cluster neb	512
		50.0	8 20	The southern and brightest nebular nucleus of a great branching cluster. [Note.—*A reference to fig. 2, Pl. III. which is a very careful and exact representation of this highly characteristic object, will explain all the apparent discordances of these descriptions. It is proper here to observe, that each observation has been referred to its proper point by sketches made at the moment of observation in the sweeping book. In fact the places of the two principal nebulous masses only in the southern part of the object have been taken, none of the others being sufficiently prominent or definite. The diagram, however, from which the figure is taken, affords data for measurement equal to direct observation in a sweep.*]	760
2845	....	5 22 49.5	158 3 27	An outlier of the group figured in III. 2. Place from diagram. v F; p L	....
2846	....	5 22 54.1	156 32 10	A nebulous group or knot..	658
2847	....	5 22 56.4	157 20 11	p B; S; R; b M. Has 2 st 9 and 10 m following....................	522
		57.6	20 37	p B; v S; R; 10″	760
2848	Δ. 89	5 22 59.8	160 5 52	p B; S; R; g l b M; a double neb. It has a v F neb attached n p	523
		62.2	5 54	B; R; a double nebula. (Clouding over.)	513
		63.5	6 25	A double neb. Pos. 339.1; 50″ dist; each F; R; g l b M; 35″ and 30″..	657
		64.6	6 57	p B; binuclear (by diagram, double); g b M; 30″	751
2849	....	5 23 39.7	154 7 16	A star 14 m, with an e F nebula about it	515
		41.7	4 26	v F. (Cloudy.) (N. B. The P D has been probably spoiled by the cloud.)	518
2850	Δ. 90	5 24 10.4	160 18 10	p B; R; g l b M; 50″	523
		11.3	18 5	v F; 40″; has a ✻ 15 m at 60″ dist pos = 19°.6.....................	657
		13.2	18 57	p B; irreg R; v g b M	751
2851	....	5 24 47.5	156 36 16	e e F; v v L. Great blotches of diffused nebulosity....................	761
2852	....	5 25 0.7	162 37 50	p B; R; b M; 90″..	672
2853	III. 590	5 25 2.4	104 11 24	v F; R; 25″..	757
2854	Δ. 237	5 25 7.5	156 32 1	p F; R; g b M; r	761
——	....	5 25 ..	160 23 ..	The southern edge of Nubecula Major. All the zone south of this is dark and starless.	751
2855	....	5 25 29.8	154 54 9	p B; L; R; g l b M; 2½′ diam; a star 9 m n p......................	515
2856	....	5 25 38.8	156 24 36	A rich, discrete cluster, class VII. Not much comp M; 10′ diam stars 13 m.	761
2857	....	5 25 56.3	158 37 2	p B; S; R; p s b M; 20″..	759
2858	....	5 26 2.5	156 44 10	A close first class D star, 10 and 11 m, with a thick nebulous mist like dust about it.	658
		5 .4	43 51	B; R; or l E; binuclear or s b M to a double star 10 and 11 m. [*Note.*—The obs gives 22^m for the R A, but this is impossible. From the context it is presumed to be 26, being evidently the same object with No. 28, ƒ 658.]	522

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2859	....	5 26 7.3	160 3 7	A large ill-defined patch at the lower edge of the Nubecula Major, which is pretty definite here, and very bright.	751
		7.3	2 40	The first of several nebulæ running together and forming a very remarkable group, which fills the field with a faint diffused nebulosity. See fig. 7, Pl. IV.	523
2860	IV. 21	5 26 9.9	112 4 3	F; irreg R; v s b M; to a st 12 m; 2 or 3 st involved, and several bright ones near.	647
2861	....	5 26 14.4	126 30 12	The cusp of a cluster of stars, 8....11 m; arranged pretty exactly in a figure of 3 with appendages. * 8 m in cusp taken.	659
2862	....	5 26 26.3	158 58 43	p B; S; R; insulated, but has a group of 4 nebulæ following in the parallel.	538
		29.0	58 19	p F; S; R; g l b M; 40″	513
2863	Δ. 211	5 26 35.1	157 38 50	The second of a great line of rich clusters which are connected by abundant scattered stars. (The first not taken.)	760
2864	....	5 27 2.0	159 59 0	The second of the group, fig. 7, Pl. IV. L; F; v g b M	573
		2.0	58 34	F; R; g b M; 40″	748
		6.0	58 57	p F; p L; irreg R	751
2865	....	5 27 7.3	160 4 19	F; v L; v g b M; the third of several whose borders join, forming the group in fig. 7, Pl. IV.	523
2866	Δ. 136	5 27 10.0	158 58 34	v F; p L; R; the first of a group of 4 neb with stars. (N.B. The *mirror newly polished.* See fig. 20, Pl. VI.)	538
2867	Δ. 136	5 27 25±	158 57 ±	F: S; the second of a group of 4 nebulæ with stars. The place interpolated from those of the 1st and 3rd by the aid of a diagram made at the time. Pl. VI., fig. 20.	538
		29.3	56 45	The first nebulous knot of a large fine nebulous cluster 3′ in extent. (N.B. *This is doubtless identical with what is called the second in ʃ 538, as it does not appear that in this obs the separate nebulæ of which the group is composed were so well distinguished as in that ʃ where a freshly polished mirror was used. The diagram of sweep 535 represents the (really) first as much fainter and more diffused than the others.*)	759
2868	Δ. 77??	5 27 35.7	158 57 3	The third of a group of 4 nebulæ with stars; p B; R; p s l b M. Pl. VI., fig. 20.	538
——	Δ. 136	5 27 45.0	158 57 37	A star 9 m, the chief of a curious cluster of mixed stars and nebulæ 5′ in diameter.	513
		47.8	57 28	The brightest star in a p L irreg cluster with nebulæ mixed.............	509
		48.8	57 37	The chief star, 9 m of a large irregular cluster. (Note. The cluster referred to is obviously the "group of 4 nebulæ with stars" of ʃ 538.) Pl. VI. fig. 20.	508
2869	Δ. 136	5 27 45±	158 58 ±	The last nebula in the group of 4 with stars. Place concluded (with no precision) from the 1st and 3rd by the aid of a diagram. [N.B. *I suspect all the nebulæ of this group to be placed several seconds too early by ʃ 538 in R A. The reductions in that ʃ are not good, and the group lies at the southern limit of the zone beyond the fair grasp of the reductions.*]	538
2870	....	5 27 48.2	157 35 34	The third of a great line of rich clusters all connected by abundance of irregularly scattered stars.	760
2871	....	5 27 56.0	120 55 2	e e F; S; R; south of several bright stars	535
		57.3	54 40	F; R; l b M; 30″; at the apex of a sort of cusp of stars	645
		58.0	56 12	v F; S; R; at the apex of a converging parcel of distant st	644
2872	....	5 28 3.2	159 59 4	The 4th of several running together (fig. 7, Pl. IV.). F; S; attached to a larger (the 5th).	523
2873	....	5 28 5.6	121 0 50	e e F; v S; certainly not to be seen except in a superbly clear night, as this is.	645
2874	....	5 28 10.5	167 52 45	e F; l E; 40″; has a coarse double star n f, 6′ distant..................	746
		14.5	53 23	e F; S; R; g b M; 15″..	670
2875	....	5 28 17.7	159 59 49	The 5th of several running together (fig. 7, Pl. IV.); attached to a smaller, No. 4.	523
2876	....	5 28 18.7	159 58 59	The 6th of several running together (fig. 7, Pl. IV.). This also is a double nebula, having a very small one attached n p (No. 7.).	523
2877	Δ. 213	5 28 20.3	157 33 57	The following part of a large irregular cluster which extends obliquely across the field. (Note. This is one member of the collection of clusters whose details are noted in ʃ 760.)	512

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2878	....	5 28 30.9	156 22 16	v B; v L; oval; v g p m b M; a beautiful nebula; it has very much resemblance to the Nubecula Major itself as seen with the naked eye, but is far brighter and more impressive in its general aspect as if the nubecula were at least doubled in intensity. (Note.—July 29, 1837. I well remember this observation, it was the result of repeated comparisons between the object seen in the telescope and the actual nubecula as seen high in the sky on the meridian, and no vague estimate carelessly set down. And who can say whether in this object, magnified and analysed by telescopes infinitely superior to what we now possess, there may not exist all the complexity of detail that the nubecula itself presents to *our* examination!)	761
		32.8	21 12	v B; v L; E; g b M: 3′	508
		34.3	21 36	p B; v L; l E; g b M; 3′..........	522
2879	....	5 28 37.6	138 48 15	e e F; R; b M; exceedingly difficult and delicate. (Sky perfectly clear.) The preceding of two.	526
2880	....	5 28 49.3	138 48 20	F; R; g b M; north of a v B group of 2 st g m, 1 = 9′, 3 or 4 = 11 ..	762
		51.4	49 18	e e F; R; b M; the following of two; in field to s is a brilliant group of stars.	526
2881	....	5 28 51.3	159 7 12	A pretty rich irregular cluster which fills the field; a knot in it taken	748
2882	....	5 28 52.4	159 15 35	A cluster; a double star in it taken..........	657
2883	....	5 29 12.9	160 6 28	p B; R; g b M..........	523
		14.5	6 7	B; p L; R; g b M; 2′..........	748
		15.6	5 53	p F; p L; R; g l b M; 2′..........	513
		17.1	6 47	v B; L; l E; g m b M; 3′..........	751
2884	....	5 29 16.8	157 33 42	The 4th of a great line of rich clusters connected by abundant irregularly scattered stars.	760
2885	....	5 29 20.4	160 52 28	v F; L; irreg R; 3 B st precede	509
		22.7	52 3	p B; R; g b M; 2′; 3 st precede..........	513
2886	....	5 29 22.2	153 20 0	e F; R; 30″..........	515
2887	....	5 29 32.9	159 16 40	The second knot in a rich cluster of irregular figure of stars 11 .... 16 m. The knot seems to be a close double or triple star.	748
		34.9	16 5	A little knot, a triple, perhaps a quadruple star, forming a point of reference in a cluster of the 7th class. The knot looks like a nebula till analysed.	657
2888	Δ. 178??	5 30 ..	158 52 ..	Here commences a very starry or resolved region of the greater Nubecula ..	759
		30 3.2	52 29	The middle of the most condensed part of a cluster of stars 13 m which runs off to the s p and joins No. 39 of this sweep.	759
2889	....	5 30 14.9	161 59 55	F; R; v l b M; 60″	672
2890	Δ. 214	5 30 25.6	157 0 50	Place of a double star class I, (h 3779), the chief of a great cluster of S st loose and filling the field. It is the forerunner of the great cluster-region of the nubecula.	658
		27.6	0 12	v B; S; R. Here comes on the richest and brightest part of the starry and clustering portion of the nubecula. (Note.—From this object being described at one time as a double star, and at another as a nebula, it is probable that it is in one of those singular close-knotted groups which especially characterize the nubeculæ.]	760
2891	....	5 30 49.3	156 35 25	A B S stellar neb, or very close cluster 15″	512
2892	....	5 30 53.8	141 2 25	e e F; p L; R; 40″..........	525
2893	Δ. 215	5 30 55.3	157 24 35	A very condensed pellet of stars 2′ diam with stragglers. The nucleus is 10 or 12″.	653
		56.1	24 28	B; S; irreg R; s m b M. A close compressed cluster, stars 12 ... 14 m	538
		57.9	24 21	⊕; B; S; R; comp M to a blaze of stars. Many stragglers	522
		58.3	25 1	⊕; v B; R; p s v m b M; resolved. (NOTE.—*This obs makes the minute of R A,* 31, *but the united testimony of all the rest shows this to be a mistake; and it appears by this very f that there are not two. The zone swept being only* 1° *in breadth; and* 2, *or, according to the MS.,* 3 *minutes having elapsed without an object before this came to be taken.)*	760
		59.5	24 35	⊕; B; irreg; R; 2′. The stars easily distinguishable	512
		60.0	24 32	B; pretty rich, compressed cluster of stars 12 m	508
2894	....	5 31 1.9	141 4 5	e F; p L; R; v l b M; 30″..........	525

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2895	....	5 31 28.1	157 6 16	A small highly condensed knot in an immensely large and very rich cluster, which fills much more than the field, and is like the Milky Way.	761
		28.6	4 31	A very small nuclear knot in an extremely rich assemblage of stars and clustering groups which fill the field.	522
2896	....	5 31 38.4	107 56 54	A fine clustering group of large stars	652
2897	....	5 32 11.1	159 17 49	p F; R; b M; 20″; in a field full of stars	748
		11.9	18 10	p B; R; b M; 40″; in a field rich with clustering stars................	509
		12.3	18 3	p B; R; g l b M; 80″ in the n p part of a cluster	513
		12.7	18 25	F; R; 30″; r	657
2898	....	5 32 38.8	160 57 12	F; R; v g l b M; 3′	751
2899	....	5 32 45.4	157 38 13	v B; S; R; p s m b M; 25″.....................................	538
2900	....	5 32 46.8	157 48 10	A pretty L, irreg cluster 7th class; chief ✱ 9 m taken (at leaving the field); the rest are 10....15 m.	759
		56.1	48 50	Chief ✱ 9 m of a v irreg cluster, 4′ long, 3′ br	512
		57.1	48 49	A cluster, 6th class	760
2901	....	5 33 5.4	159 22 28	The general middle of a cluster of loose stars 11....16 m. It is rich, and fills the whole field.	513
2902	....	5 33 15.0	160 4 17	F; v L and diffused; irreg R; g b M	523
2903	Δ. 218	5 33 36.3	157 49 11	p B; v L; v g l b M; l E; 4′. A fine cluster precedes it..............	759
		37.1	49 41	v F; v L; R; v g l b M; 4′ diam....................................	760
2904	....	5 33 41.4	161 11 30	p B; R; p g l b M; 2′; a star 10 m involved, p......................	509
2905	Δ. 98	5 33 46.7	160 16 3	B; R; g b M; 60″. [NOTE.—*The obs makes the degree* 159, *but although the zone swept in this ∫ was intended to be only of* 1° *in extent* (159....*to* 160), *yet as the star B* 1065 (*P D* 160.15) *was taken shortly after, in it, it appears to have overlapped considerably into the next degree, on which account I am induced to regard this neb as identical with No.* 33, ∫ 751, *in which no mistake of the degree was possible.*]	748
		49.4	16 3	B; R; g b M; 60″. See note on the last obs........................	751
2906	....	5 33 51.1	157 34 7	v S; F; R; 12″. In the northern part of a cluster of stars 14 m, 8′ long, 3′ br.	538
2907	....	5 34 54.1	169 58 40	v F; S; l E; b M; 2 st 9 m follow toward the north.................	670
2908	Δ. 241	5 34 59.4	157 3 17	A very L, v rich cluster of separate stars 9....11 m, which fills the whole field.	508
		64.6	0 10	Cluster 7th class. The 2nd of two stars 9 m, which may be considered the leading stars of the very large and fine cluster of the Nubecula Major, which fills many fields, is of all degrees of condensation, and much broken up into groups and patches.	658
		73.9	1 19	An ill defined nebuloid group of stars 15 m. (N. B.—Clouds very troublesome.) The field full of grouping stars.	653
2909	....	5 35 16.7	161 48 30	v B; S; l E; g m b M; r. Almost a ⊕	672
2910	....	5 35 23.8	157 40 11	B; L; g b M. The first of 3 neb which run together..................	522
		26.1	39 25	v F; p L; irreg R. The first of 3, which run together. See Plate III. fig. 5.	538
2911	Δ. 240	5 35 23.8	156 8 10	p B; R; g b M; 60″; resolved into stars 13...15 m	539
		25.0	7 41	A rich, R, p L cluster of stars 12 m; l comp; 5′ l; one ✱ 11 m........	515
2912	Δ. 100?	5 35 38.8	160 3 32	v F	751
2913	Δ. 219?	5 35 35.2	157 40 51	B; L; g b M. The second of 3 which run together	522
		45.3	40 30	B; L; E. The middle of 3 which run together	538
		46.6	40 57	v B; v L; g b M. The second of a train of 3. The first is a large irregular nebula.	760
		47.5	40 56	v B; v L. A singular figure like 3 nebulæ lumped together	508
		50.1	41 3	p B; irreg fig; g l b M. (By a diagram made at the time, it consists of 3 pretty distinct masses which extend over a considerable space in R A. Plate III. fig. 5.)	512
2914	....	5 35 53.5	156 59 46	A more condensed part of the great cluster (761, 39), of a crescent-like form, occupying one field. Rich and fine.	761
2915	....	5 35 56.3	161 5 54	⊕; B; R; g b M; 2′. Resolved into stars..........................	656
		59.6	7 0	F (?); R; g b M; 3′. (Hazy sky.)	509

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2916	Δ. 220	5 35 57.1	157 41 11	B; L; b M. The 3d of 3 which run together. (Plate III. fig. 5.)	522
		57.1	41 47	v B; L; g b M. The third of a triplet..............................	760
		59.0	41 15	p B; L; R. The third of 3 which run together	538
2917	....	5 36 10.5	159 9 42	v F; R; g b M; 90″. [*There is strong ground to suspect an error of a degree in the P D. It should most likely be* 160.]	748
2918	....	5 36 30.3	157 40 4	p F; L; R; follows a group of 3 running together.....................	538
		31.0	40 16	F; irreg R; g l b M; r; 2′. (Pl. III, fig. 5).........................	508
		31.6	40 7	Irreg R; r; 2′ diam..	760
		31.9	39 48	F; irreg R; g l b M..	512
		38.8	40 11	v F; R; follows 3 v B L nebulæ which run together	522
2919	....	5 36 36.7	157 5 23	B; R; v g l b M; 20″; a rich clustering part precedes	653
		37.1	5 56	v B; R; v g v l b M; 20″...	761
		37.7	4 46	B; S; v g b M; 20″	508
		40.7	5 35	B; R; g b M; 40″...	658
2920	....	5 36 43.8	160 39 26	p B; S; R; g b M; insulated	523
		44.3	38 57	B; R; g l b M; 25″; has a ∗ 9 m, 5′, n p.............................	513
		46.2	39 52	p B; S; R; g b M; 20″..	751
2921	....	5 36 43.8	120 9 33	v F; S; R; g p m b M; 20″; in a rich field	645
		44.7	9 43	v F; S; R; p s l b M; 25″	535
2922	....	5 37 13.3	159 1 18	The chief ∗ (9 m) of a L, irreg figured, looped or hooked cluster of stars 12 . . . 15 m; rich and various, and filling the field	759
2923	....	5 37 30.4	160 20 0	v F; R; g b M; the first of a group of six nebulæ. See Pl. IV, fig. 9.—(N.B.—In the original obs all the nebulæ of this group in the 748th sweep have the P D 159°, but this having been satisfactorily proved to be a mistaken reading for 160; it is corrected accordingly here and subsequently.)	748
2924	....	5 37 44.4	124 1 59	Cluster, 8th class; coarse, loose, and filling the field; stars 10 . . . . 13 m. Place, that of a double star in a vacant part.	663
2925	....	5 37 46.1	160 17 15	The second of a group. Pl. IV, fig. 9................................	748
2926	....	5 37 51.5	159 42 40	A very faint large oval ill-defined nebula; not taken in sweeping, but laid down from a careful drawing. See Notes on the Catalogue of Nubecula Major.	
2927	....	5 38 8.1	157 31 6	F; l E; g b M; 2′	760
2928	....	5 38 9.0	159 29 10	Cl VI; v F st and nebulosity of irregular branching figure, or rather 3 clusters connected. See Notes on Catal of Nubecula Major.	
2929	....	5 38 20 —	159 53 10	v v F; v v L; v g l b M. See do. do.	
2930	....	5 38 27.1	161 6 20	p B; S; R; g b M; 30″; insulated.....................................	523
2931	....	5 38 29.3	159 30 57	A v L v rich cluster of sc st 10 . . . . 15 m which more than fills the field ..	513
2932	....	5 38 40.6	160 46 13	p B; R; b M; the preceding of 2 on the same parallel; a star 9 m between	523
2933	Δ. 102	5 38 43.2	160 15 10	B; R; g b M; 90″; the 3rd of a group of 6..........................	748
		43.9	15 52	v B; R; the 3rd of a group of 7. Pl. IV, fig. 9	751
2934	III. 241	5 38 43.5	112 4 50	e F; R; g b M; 20″	647
2935	....	5 38 43.9	160 21 24	p F; the 4th of a group of 7. Pl. IV, fig. 9.........................	751
		49±	21 54	p F; S; R; g b M; the 5th (4th properly) of a group of 6, R A only estimated from a rough diagram incorrect (as it would seem) in the order of the objects.	748
2936	....	5 38 46±	160 13 24	v F; the 5th (4th in MS) of a group of 6. Pl. IV, fig. 9	748
2937	....	5 38 59.0	156 57 46	v F; E; g l b M; 40″; north of 2 stars 10 m..........................	761
2938	Δ. 103??	5 39 29.0	160 18 54	p B; R; last of a group of 6. Pl. IV, fig. 9	748
		31.6	19 50	B; the 6th of a group of 7	751
2939	....	5 39 40±	160 16 ±	v F and S; the last of a group of 7; this nebula escaped notice in ∫ 748. Pl. IV, fig. 9.	751
2940	Δ. 143	5 39 50.1	159 5 37	The middle of a large extended faint nebulous mass which forms the northern branch of the great looped nebula, and is almost, or entirely, detached from it. See the next object.	513

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2941	Δ. 142	5 39 51.3	159 11 17	The nucleus of the great looped nebula about 30 Doradûs................	513
		52.8	11 21	The chief star of the great nebula..	522
		53.4	11 22	Do.	653
		53.7	11 14	Do.	656
		53.9	11 6	Do ; the great nebula ; an assemblage of loops	508
		53.9	11 9	Do.	509
		54.0	11 2	Do.	513
		54.0	11 5	See Pl. II. fig. 4, and the explanation	657
2942	....	5 40 16	159 34 28	p L, p B, m E, of irreg rounded and somewhat serpentine figure, much brighter in its foll part; E generally in parallel. Involves 5 stars, 2 of which are 10 m. See Catal of Nubecula Major.	
2943	....	5 40 31.2	160 46 13	B ; R ; b M ; resolved ; the following of two on the same parallel, a star 9 m intervening.	523
2944	Δ. 594	5 40 48.6	124 18 47	⊕; B ; R ; with an appendage to northward ; 2½′ diam. (N.B.—I have no confidence in this R A. The reductions of this *f* run badly, and the object was taken at leaving the field.)	662
		55.2	19 28	B ; irreg R ; g b M ; 3′ l ; 2′ br with stars appended. This R A to be preferred.	663
2945	....	5 40 58.4	154 22 18	B ; L ; R ; g l b M ; 90″ ; has a ✻ 10 m 2′ dist 25° s f................	518
		62.7 :	22 35	p F ; L ; R ; v l b M ; 2′..	515
		66.1	22 29	F ; R ; g l b M ; 40″..	539
2946	....	5 41 5.1	145 36 20	e F ; R ; v l b M ; 40″..	521
2947	....	5 41 5.6	159 44 39	The preceding of two forming a double nebula. The place deduced from that of the following and brighter, by Δ R A = 7ˢ.1, Δ N P D = 20″, as they result from the drawing of Dec. 4, 1837. Pl. III. fig. 4.	523
2948	....	5 41 9.8	159 49 43	The north preceding of the four principal nuclei of the nebula of Pl. III. fig. 4	
2949	Δ. 152 ? ?	5 41 10.9	159 51 33	The most southern of a group of 4 or 5 nebulæ, 5′ diam mixed with stars. This is the south preceding of the four chief nuclei of the complex group of Pl. III. fig. 4.	523
2950	Δ. 145 ?	5 41 12.7	159 44 13	B ; R ; double ; the other sp is F ; R ; followed by clustering stars.	523
2951	....	5 41 25.0	159 29 10—	Cluster VI of v F st and nebula. See Catal of Nubecula Major.	
2952	....	5 41 28.3	159 49 14	The north following nucleus of the complex group of Pl. III. fig. 4, from drawing.	
2953	....	5 41 32.2	159 50 41	The south following nucleus of the complex group of Pl. III. fig. 4, from drawing.	
2954	....	5 41 34.9	159 45 47	A very faint nearly round nebula close to a star 10 m, not observed in sweeping, but laid down, Dec 4, 1837, in the drawing fig. 4, Pl. III. whence its place is derived.	
2955	....	5 41 48.2	158 32 42	p F ; S ; R..	673
		49.8	32 21	e F ; S ; R ; insulated	538
2956	....	5 41 49.7	159 45 19	B ; p S ; R ; l b M ; follows a star 10 m with other S st about it. Not observed in sweeping, but laid down in the drawing of Dec 4, 1837, whence its place is derived, III, 4.	
2957	....	5 42 20.0	159 31 55	v F ; S ; m E ; g l b M ; 1′ l ; perhaps a v F double neb. See Catalogue of Nubecula Major.	
2958	....	5 42 29.1	142 9 0	e F ; R ; 40″ ; a line of 3 st, 10 m to s, points nearly to it	765
2959	....	5 42 32.4	158 26 25	v F ; S ; R ; 12″	538
2960	....	5 42 50.9	152 51 26	F ; irreg R ; p s b M ; s f a small group	524
		52.1	51 24	e F ; S ; R ; has a star 16 m in centre	539
		52.6	51 3	p F, R ; p s l b M ; 50″	756
2961	....	5 42 51.0	157 24 20	A star 9 m, chief of a F irreg oblong cluster 3′ in extent	658
		52.4	24 4	Cluster, irregularly elongated ; not very rich	760
		54.5	26 25	F ; S ; R..	759
2962	....	5 42 52.0	159 17 20	Cl VI. v F, R, 60″, partially resolved. See Catal of the Nubecula Major	....
2963	Δ. 184 ? ?	5 42 54.9	159 0 4	v F ; S ; R. This nebula forms an appendage to the skirts of the great looped nebula 30 Doradûs, which hang down in visible fringes from the upper (southern) part of the field.	759
2964	....	5 43 8.2	141 36 58	p B ; R ; v l b M ; 30″	525

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2965	Δ. 185??	5 43 15.8	158 20 55	A small close knot or cluster, 40″	759
		——	20 25	B; S clustering group or ⊕; 30″ stars visible. [N. B.—This obs makes R A 5 42 48.1, but this must have been observed by mistake on the moveable wire. See Catal of Nubec Major.]	538
2966	Δ. 147??	5 43 20.6	159 17 21	The cluster s f the great looped nebula	522
	Δ. 151? or	22.0	17 23	A bright S cluster of distinct stars. (Thick haze.)	509
	Δ. 154	24.9	17 12	⊕; B; R; 3′; all resolved into stars 13....16 m	673
		25.0	16 50	⊕ irreg R; p s m b M; 2′	657
		....	17 11	B; S; m comp; not m b M; irreg oval; 3′; stars distinct 13 m. [This obs makes the R A 10s.3, which I have not allowed to stand against the united weight of the rest. The object was taken at leaving the field, and the slider probably not brought fully home to the stop.]	748
2967	....	5 43 32.9	111 36 54	v F; S; R or l E; g b M; 15″	647
2968	....	5 44 11.3	161 24 31	p B; L; p m E; g l b M; has a ✱ 13 m in the middle	523
2969	....	5 44 25.5	156 58 46	p F; R; g b M; 80″	761
		34.6::	58 37	v F; R; 30″. The obs in R A is marked as uncertain	760
2970	Δ. 153??	5 45 11.5	159 14 40	e F; p L; l E	657
2971	....	5 45 14.0	160 42 41	F; R; g v l b M; 60″	673
		19.5	43 7	B; R; g m b M; 40″	751
2972	....	5 45 15.2	158 36 19	p F; p L; R; v g v l b M; 35″	538
		15.8	36 31	F; S; R; g b M; 20″	522
		18.8	36 39	p F; p L; R; v g l b M; 80″	512
2973	....	5 46 51.2	161 3 0	v F; S; R; g b M	673
		52.7	3 47	v F; R; g b M; 40″	751
2974	....	5 46 52.1	158 6 11	e F; p L; irreg R	538
2975	Δ. 155	5 46 54.3	159 50 35	A p B cluster nebula 90″	523
		56.8	50 5	F (?) L; R; thick haze	509
		57.2	49 50	F cluster; irreg fig; g b M; 2′; resolved	657
		59.3	50 54	F; irreg fig; r; one star seen; 90″	673
		....	50 16	Irreg oval cluster; v F; 2′ diam; v l comp M; almost nebulous. Stars = 16 m. [This obs gives the R A 46m 39s.5 which must evidently be rejected. Taken at leaving field, the eye-piece having remained untouched since No. 42 of the same ƒ. See note on that obs.]	748
2976	....	5 47 13.3	140 37 35	e e F; v S; n f a triangle of stars 10 m which form part of a bright group	762
2977	....	5 48 6.8	158 33 43	F; S; R. A star 11 m precedes	759
2978	....	5 48 10.1	157 29 46	p B; E; resolved. I see the stars in it; 2′ l	522
		10.4	30 21	p F; irreg R; 40 or 50″; v l b M	538
		11.2	29 45	F; irreg R; with small stars	760
		13.4	30 8	p B; S; resolved	512
		14.4	30 25	F; irreg fig; 90″ l; 15″ br; r	658
2979	....	5 48 50.1	159 10 57	A v S, B knot, probably 6 or 8 v S stars wedged into a close group	748
		54.5	10 50	⊕; v s m b M; 15″	657
2980	....	5 49 30.1	153 42 49	F; R; v g v l b M; 60″	539
		30.3	43 27	v F; p L; R; g l b M; 80″	515
——	Nubec.	5 50	158°..159	Here follows a legion of v small scattered stars all indefinite and loose	
2981	Δ. 106	5 50 34.3	160 6 30	B, L neb; 6′ l, 5′ br; resolved, in part; chief ✱ 11 m taken	513
		34.8	7 2	Cluster 6th class; F; oval or irreg fig; v m comp; st = 15 m	751
		35.1	6 39	p B; L; irreg R; g l b M; 3′; resolved into st 15 m	523
		35.4	7 8	Cl; irreg fig; consists of 3 or 4 disjoined clusters, the middle one the largest and brightest; of 3 or 4 L st and nebulosity; chief ✱ taken.	673
		37.5	6 20	Cl 6th class; irreg R; F; g l b M; 3′ barely resolved into v S stars and a few large ones.	657
2982	....	5 50 43.2	161 31 11	v F; v g l b M; 3′	673
2983	....	5 51 12.4	155 21 0	p B; v S; R; v g l b M; 12″	515
		13.1	21 9	p B; v S; g m b M; 15″	539
		13.2	21 29	p B; e S; R; g b M; 10″	518

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
2984	....	5 51 59.9	116 40 8	e F; S; R; has a * 13 m in centre	530
2985	....	5 52 14.8	159 31 38	v F; R; 50″; g b M	523
2986	....	5 52 41.6	159 23 48	B; S; R; 15″	523
		43.2	23 40	p B; v S; R; 12″	657
		43.9	24 14	p F; v S; g m b M	748
2987	....	5 52 42.6	157 21 53	p F; S; R..	653
		42.8	21 58	F; R; g b M; 30″	658
		43.9	21 56	p F; S; R; g b M; 18″..	522
		44.5	21 53	p F; R; g b M..	760
		46.4	21 35	p B; R; g l b M; 45″..	508
		46.9	21 47	F; R; l b M; 30″	538
		48.0	22 23	F; R	512
2988	....	5 52 59.1	149 56 10	Chief * of a cluster 8th class of about a dozen bright and some smaller stars	665
2989	....	5 53 51.0	161 12 45	p B; p L; R; g b M; 60″	513
		52.5	12 25	F; R; p m b M; 50″	673
2990	....	5 53 58.2	157 27 28	p F; S; R..	653
		58.3	26 52	p F; R; b M; 30″	538
		58.5	27 21	F; R; g b M; r	522
		58.9	27 31	p F; R; g p m b M; r	760
		59.5	27 15	v F; R; g l b M; 60″. Among stars	512
2991	....	5 54 16.7	161 7 45	B; L; R; g b M; 90″	513
		17.7	7 40	v B; R; g v m b M; 80″; r	673
		18.8	8 14	⊕; B; R; g b M; 40″; r	656
		22.8	8 57	B; R; g m b M; 80″	751
2992	Δ. 160	5 54 21.3	159 31 32	p B; R; 30″; the preceding of 2..	523
		22.0	30 52	⊕; p B; R; g m b M; resolved; stars 14 . . . 16 m; has a v v F neb n f	748
		22.3	30 48	p B; R; b M; 60″; has a * 10.11 m, n p (thick haze).....	509
		24.4	31 15	p F; R; 40″. Remarkably situated in a triangle of S stars; the preceding of two.	657
2993	....	5 54 31.9	155 51 45	e F; S; R; has 3 B st pretty distinct towards the south................	515
2994	....	5 54 38.0	159 30 42	v F; R; 30″; the following of 2..	523
		38.9	30 35	v F; R; 25″; the following of 2..	657
2995	....	5 55 11.3	158 37 0	F; l E; g b M	759
		11.4	37 16	p F; irreg R; p s b M..	522
		12.3	37 25	p F; R; b M; 30″	538
2996	....	5 56 25.6	149 7 42	e F; S; R; 20″; has a * 12 m, s f very near	519
2997	....	5 56 29.4	158 13 29	F; R; b M; 20″; connected with stars, &c	656
		32.1	13 15	v F; R; b M; 30″	538
2998	....	5 56 37.3	160 56 47	F; l E; r	751
2999	....	5 56 50.5	140 43 55	e e F; attached to a star 15 m	762
		51.3	44 27	e e F; R; attached to a v S star. [In the obs this is called "rather a doubtful object," but all doubt is removed by the subsequent obs of ƒ 762.]	526
3000	....	5 57 16.4	159 35 3	F; v S; R; v s b M; stellar..	673
3001	....	5 57 26.2	159 2 8	F; R; b M; 45″	538
3002	....	5 57 45.8	156 25 1	e e F; R or l E; attached to a * 16 m..............................	761
3003	....	5 57 55.3	157 16 16	p B; R; g b M; 20″ (?)..	522
		56.2	16 24	p F; R; v g b M; 90″	760
		56.5	16 19	F; L; R; g l b M; 100″	508
		56.6	16 11	F; L; R; g b M; 90″	512
3004	....	5 58 5.3	155 28 49	p B; L; R; v g l b M; 80″	539
		5.6	28 33	v F; p L; R; v l b M; 80″; in a rich field........................	515
		6.0	28 56	F; L; g v l b M; 90″; in a rich field	518

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3005	Δ. 196	5 58 39.9	158 28 8	B; S; R; 20″	538
		39.9	27 39	p B; R; g b M; 30″	656
		40.8	27 38	B; R; g b M; 30″	759
		42.3	28 46	F; R; the preceding of three	522
		44.5	28 29	p F; S; irreg R; p s b M; 25″	512
3006	Δ. 161??	5 58 47.4	159 11 56	v B; R; g m b M; 60″ (in a ∫ of 1° continued to 6^h 4^m, in which no other nebula occurs after this.)	748
		49.1	12 0	v B; R; g b M; 30″	523
		50.3	12 7	⊕; B; S; R; g m b M; 70″; resolved	673
		50.5	12 10	⊕; v B; R; v g v m b M; r.—[Note. The minute of R A given by this obs is 59, but this is decidedly mistaken. (See the remark on ∫ 748 above, no nebula under those circumstances, however faint, to say nothing of so conspicuous a one, could by possibility have escaped notice.)]	657
3007	Δ. 193	5 58 58.8	158 38 13	p B; R; g b M; 40″	759
		59.2	38 11	p F; S; R; the second of three	522
		60.3	37 48	p B; S; R; has a ∗ 15 m close to the edge, n f	538
		63.2	38 24	p F; S; irreg R; p s b M; 25″	512
3008	....	5 58 59.3	158 17 52	p F; R; g b M; 30″	759
3009	....	5 59 17.3	172 9 41	F; S; R; g b M; 18″	668
		20.8	7 47	F; irreg R; p s l b M; 40″	666
3010	....	5 59 24.4	153 43 35	F; R; g l b M; 40″; a ∗ 9 m follows in parallel, and 3 more 11 m near	518
		25.7	43 11	v F; p L; R; v g l b M; 80″	515
		25.7	43 14	F; R; v g l b M; 40″	539
3011	Δ. 194	5 59 46.5	158 31 4	⊕; no other description	656
		47.8	30 48	v B; R; p s m b M; 60″	759
		47.9	30 32	v B; R; m b M; 40″	538
		50.6	31 36	⊕; B; R; p s b M; resolved; much compressed; the 3rd of 3	522
		51.6	31 10	v B; R; g m b M; 90″; r	512
3012	Δ. 223?	6 0 11.6	157 56 54	F; S; R; g b M; 15″	760
3013	....	6 0 24.8	164 21 25	F; p L; R; g p m b M; 2′	672
3014	....	6 0 50.0	111 43 46	F; p m E; g l b M; 40″	647
3015	....	6 1 0.5	158 38 54	p F; R; l b M; 50″	538
		4.5	38 39	v F; L; R; g b M; 2′	512
3016	....	6 1 7.1	160 43 10	e e F; v L; R; g l b M; 4′	657
3017	....	6 1 28.9	156 51 16	e e F; R; p L; g b M; 2′	761
3018	....	6 1 35.2	162 58 40	p F; R; g m b M; 90″	672
3019	....	6 1 45.3	153 45 49	e F; v S; R; 10″	539
3020	....	6 1 46.7	157 43 31	F; R; l b M; 15″	653
		48.9	43 42	p F; irreg R; r	760
3021	....	6 2 23.8	155 15 8	v F; S; R	515
3022	....	6 4 0.6	124 4 15	p F; v m E; g v l b M; 2′ l	663
3023	....	6 4 36.6	142 29 5	p B; v S; E; v s b M; a ruddy star 9 m prec about 5^s in R A	765
3024	II. 265	6 4 57.3	111 46 7	F; R; p s l b M; 60″	533
		57.9	45 55	p B; R; g m b M; 40″	647
		58.6	46 20	B; p L; R; p s p m b M. Many stars near it	532
		59.6	46 11	p F; R; g b M; 60″; r	768
3025	....	6 5 17.9	159 33 28	Double nebula, pos 12°.5; larger p B; R; g b M; 40″; smaller v F; R; g l b M.	523
		19.8	33 43	F; irreg R; g b M	673
		20.3	33 40	v F; irreg R; g b M; 50″; r	657
3026	....	6 5 41.7	155 3 54	F; irreg fig; g l b M; has 2 or 3 stars in it	518
3027	....	6 6 1.6	164 42 15	v F; R; g b M; 2′	672
3028	....	6 6 23.1	157 4 27	v F; R; 40″	538
		24.7	3 45	v F; R; g b M; 40″	760

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3029	....	6 8 9.1	133? 36 57	e F; R; v l b M; 40″	528
		12.8	134? 37 0	e e F; R. P D mistaken 1° in one or other of these obs	804
3030	....	6 8 24.1	133? 39 16	e F; v S; p s l b M; rather a doubtful object	528
		25.3	134? 38 45	e F; R; P D 1° mistaken in one or other of these obs	804
3031	....	6 8 40.0	163 21 50	F; v S; R; b M	672
3032	....	6 9 6.3	111 19 17	p B; p L; m E in pos = 87° ±; p s l b M; 2½′ l, 40″ br, to a tolerably well defined round nucleus.	533
3033	....	6 9 11.3	116 42 54	p B; E	646
		12.5	43 18	v F; R; v l b M; 50″	530
		12.9	43 2	p F; R; p s l b M; 25″	531
3034	....	6 9 58±	152 29 23	p F; R; b M; 20″	756
3035	....	6 10 28.4	165 23 59	p B; irreg R; v g p m b M; 2′; r	671
3036	....	6 12 41.5	159 4 34	v B; R; g m b M; 30″	653
		44.5	4 40	v B; R; p s m b M; 60″	673
		51.5	4 11	v B; S; R; p g v m b M; 35″; not resolvable. [This observation makes the degree of polar distance 158, but the similarity of descriptions and other particulars of general agreement, together with the want of any other observation of such a nebula in a part of the heavens thoroughly examined, in the 168th degree, render it almost a certainty that the nebulæ are identical.]	538
3037	....	6 12 50.8	163 47 25	v F; L; R; g v l b M; 3′	672
3038	....	6 13 12.6	161 28 58	v F; R; g l b M; 30″. A triple star precedes	673
3039	Δ. 201	6 13 42.3	158 12 35	B; S; R; or l E; resolved into stars 14 .... 16 m; 50″	538
		42.6	12 38	B; irreg R; or l E; g b M; 80″; r	653
3040	....	6 14 20.9	112 0 15	v F; p L; R; v g l b M; 40″	532
3041	....	6 14 52.1	117 10 20	B; R; p s m b M; 30″	646
		54.2	9 28	v B; R; p s m b M; 30″; r	530
3042	....	6 16 12.8	134 41 8	A poor, very coarsely scattered, but brilliant cluster of 8th class. Place of a star 8 m = B 1222, the chief in cl.	527
3043	....	6 17 27.2	112 45 27	v F; S; R; has a v S star at n f edge, and a double ✱ n f	533
		28.3	44 10	F; R; g l b M; has 1 or 2 st on it and a small close double star (dist 3″, 12 and 12 m) north.	532
		30.1	46 14	F; L; R; v g l b M; 80 or 90″; has 1 or 2 st in or near M	768
3044	....	6 17 32.0	147 28 47	v F; l E; v g b M; the preceding of 2	519
3045	....	6 17 32.4	147 26 42	v F; l E; v g v l b M; the following of 2	519
3046	....	6 18 45.3	113 54 30	e F; R; has a coarse D star preceding on same parallel 90″ dist	534
3047	....	6 20 24.2	154 22 27	F; R; g l b M; 20″	539
3048	....	6 20 ..	154 51 41	Place doubtful, clouded before transit over wire and bisection, the approx R A given by the obs is 34ˢ.8, which must be too little.	518
		20 42.5	52 10	e F; v S; R; the preceding of 3	515
3049	....	6 20 48.5	154 54 30	e F; S; l E; the middle of 3	515
3050	....	6 21 4.2	157 26 51	F; p L; R; g v l b M; precedes a double star	522
		4.2	26 11	F; p L; irreg R; g l b m; 2′	653
		6.2	25 35	F; L; R; 50″; among 10 or 12 stars 10 and 11 m	538
3051	....	6 21 4.4	154 57 14	e F; S; the last of 3	515
3052	....	6 21 42.4	154 50 48	v F; S; R; near a star 10 m	515
3053	Δ. 616?	6 23 2.7	121 10 17	p B; R; g b M; 4′ diam; r or resolved, among B stars	678
		8.9	10 29	p B; R; v g l b M; all evidently resolved into stars, not very rich. Something between a cl and a ⊕. [This obs makes the R A 24^m 8.9, but it is pretty clear that this is a misreading of the chronometer.]	645
3054	....	6 23 51.3	158 49 27	F; p L; R; 30″	538
		54.1	49 55	v F; R; g l b M; 20″	653
		54.7	49 14	v F; S; R	673

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3055	....	6 26 47.6	158 48 45	B; p L; R; v g m b M; 50″	538
		47.6	49 4	p B; R; g b M; 50″; has a double star preceding	653
		50.0	49 16	F; R; v g l b M	522
		50.6	48 20	p B; R; g b M; 30″	545
3056	....	6 27 52.1	124 41 51	e F; R; v l b M; 25 . . . 30′	541
		56.9	41 20	e F; l E; 25″. Some light in field from rising moon	663
3057	....	6 29 14.9	154 12 19	F; L; R; v g l b M; 2′	518
		15.4	12 11	p B; L; R; v g b M; r; diam in R A = 17^s of time	539
		17.9	11 47	F; v L; R; g v l b M; 3′	515
3058	....	6 31 27.9	114 42 28	Not v F; R; or l E; p s l b M; E between 2 v S st, and has two stars 8′ m s p pointing to it.	530
3059	....	6 34 24.4	122 19 15	p B; S; R; 20″; has 2 or 3 S st close to it	678
3060	....	6 35 47.0	113 18 22	p F; S; R; in a field with numerous stars. 113° is the right P d	533
		47.8	18 55	F; S; R; g p m b M; 12″	768
		50.1	18 30	p B; S; R; l b M; 20″. [This obs makes the P d 112°, but this was examined in *ſ* 533, and declared erroneous as above.]	532
3061	....	6 35 53.6	117 18 4	p F; R; p s l b M; 35″	531
		55.6	17 28 :	F; E; b M; 20″	530
		56.6	18 23	p B; R; g p m b M; 80″; r	769
3062	....	6 38 5.0	117 28 23	p F; L; irreg R; or l E; g b M; 2′	769
3063	....	6 40 31.8	116 33 58	A double nebula the preceding e F; the following (whose place is here set down) p B; both R; g b M; in a field full of stars, among which is also a third nebula.	530
3064	....	6 40 50.9	116 32 28	e F; S; R; between stars. A double nebula precedes	530
3065	Δ. 578	6 42 55.1	125 48 30	B; R; g p m b M; 3′ all resolved into st 14 m. In the centre is a * 13 m	541
		58.5	49 17	⊕; p B; R; g b M; 90″; resolved into st 14 m	801
		59.3	48 51	B; irreg R; g b M; 3′; resolved into st 14 . . . . 16 m with stragglers, and some large stars near.	663
		59.3	49 23	⊕; p B; irr R; g b M; 2½′; resolved into st 13 m	809
3066	....	6 43 10.8	153 32 23	v F; R; v g l b M; 30″	539
3067	....	6 47 34.3	154 4 39	F; v S; R; makes a small triangle with 2 stars	515
3068	....	6 47 46.0	154 8 12	e F; R; 50″	539
		48.3	7 23	v F; p L; l E; in the parallel	515
3069	....	6 48 24.1	130 39 58	p B; m E; in pos 43°; p s l b M; 75″ l; among many stars	754
		24.9	38 40	p B; v m E; pos 46°.6; p s b M; 90″ l; 10″ br; in a field very full of small stars.	529
3070	VII. 14 h. 422	6 51 40.7	103 28 33	A large region full of scattered stars, forming a cluster of which the chief (= 8 m) taken. It seems, however, to be only a clustering part of the milky way which here comes on rather suddenly.	757
3071	....	6 55 56.4	118 27 43	p B; p L; l E; g b M; r; 2′ long	769
3072	....	6 57 8.8	131 49 7	v F; p L? l E? g m b M; in field with many stars	804
		10.1	49 40	F; v S; R; p s l b M; 15″; like a blotted star; in field with many small stars.	528
3073	....	7 0 28.7	102 54 22	A pretty rich cluster; irreg fig; 7′ diam; g b M; stars 10 . . . 14 m; place that of a D star the chief *	676
3074	....	7 3 6.8	157 8 25	Coarse loose cluster of about 30 stars; many 11 m; one 10 m taken	538
3075	V. 21	7 9 39.7	102 54 48	A very singular nebula, much like the profile of a bust, (head, neck, and shoulders,) or a silhouette portrait, very large, pretty well defined, light nearly uniform, about 12′ diam. In a crowded field of milky way stars, many of which are projected on it. See fig. 4, Pl. IV.	757
3076	VII. 12 h. 440	7 10 1.3	105 20 12	Middle of a fine L; rich cluster not m comp M. Stars 9 . . . . . 12 m; fills field.	675
3077	VII. 17 h. 441	7 11 40.0	114 38 48	The * No. 905 A S C is the chief of a fine cluster of discrete stars, 60° or 70 in number. R; g b M; 8′ diam.	530
3078	....	7 14 40.0	152 2 17	p F; p L; g b M; 90″ l; 60″ br	682
		40.1	2 46	p B; E; or irreg fig; g l b M	524
3079	....	7 16 6.2	117 12 31	p F; R; v g m b M; 40″; in a rich field	771

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3080	VIII. 35	7 16 8.2	102 56 11	The most comp part of a great sc cl or rather region, more crowded with stars than the rest of the milky way, though hardly entitled to rank as a cluster. The st run in singular lines and curves on a dark ground.	757
3081	....	7 17 17.7	110 36 33	Cluster; irreg R; p m comp 6′. Stars of mixed magnitudes	677
		25.9	31 32	Cluster; 7th class; p comp; 4′ or 5′ in extent. Stars 12 m. [One or other of these observations seems to have been mis-read by 5′ in P D.]	768
3082	....	7 17 20±	117 3 —	p F; R; b M; 30″; nearly on meridian of η Canis, or perhaps somewhat preceding.	769
3083	....	7 17 37.4	110 41 43	A cluster composed of two groups of bright stars separated in R A by a dark interval. Chief ⁎ of preceding group taken.	677
		46.3	41 21	Place of a D star, chief of a cluster 8th class	768
3084	....	7 18 8.5	152 45 26	v F; v S; R. In a field full of stars....................................	524
3085	....	7 21 45.5	158 40 27	F; p L; p m E; p s l b M; 90″; pos of extension = 117°	546
		47.7	40 26	B; L; m E; g b M; 2′ l; 1′ br	538
3086	....	7 24 0.9	106 50 35	A small but brilliant group of 6 or 8 large stars, 8, 9, and 10 m, within a very small compass.	675
3087	....	7 28 2.9	151 54 0	v F; L; R; g b M; r. Is no doubt a very distant cluster of 6th class ..	682
3088	VIII. 38 h. 459	7 28 49.6	104 6 50	A very L, pretty rich, splendid cluster, which more than fills the field. Place of the chief ⁎ a fine double star. [N.B.—P D by obs 103°, but this is a mistake. The cluster is VIII. 38, and not VII. 38, as misprinted in h. 459.	757
3089	VII. 67	7 28 51.5	110 14 8	A large fine rich cluster, not much compressed, but nearly filling the field. Stars 11....13 m, no conspicuous star, place that of a coarse D star 11 and 11 m.	677
3090	VII. 28	7 29 14.8	103 29 1	A very large rich fine cluster of small stars which nearly fills the field. Place that of a D star, class II.	676
3091	....	7 31 39.3	137 14 31	e F; L; p m E; v l b M; involves 2 stars	553
3092	VI. 36	7 33 21.9	108 41 35	A rather irreg cluster of 8th class; p m comp. The most comp part forms a ridge or body of stars elongated in the meridian. Stars 12....15 m with larger outliers.	677
3093	IV. 39 + M. 46 =	7 34 1.1	104 20 50	○. A very fine Planetary Nebula, oval, uniform in light, and of a very *flat* appearance; rather faint; diam in R A = 4ˢ.0; has a ⁎ 15 m on it, and one 13 m close to its border. This object is excentrically situated in a superb cluster of stars 12....16 m (46 Messier).	676
	h. 463 + 464	3.8	20 18	○. A fine, nearly uniform, slightly elliptic Planetary Nebula, 40″ diam. A ⁎ 14 m, is excentrically situated in or on it, which is doubtless only superposed and belongs to the fine cluster Mess 46, in which (somewhat north of the most compressed part) this object is situated. A very uncommon and indeed unique combination, if No. 3154 be not a case in point.	757
3094	....	7 34 16.4	121 15 40	A cluster of about 150 st; B; p L; p rich; not much more comp M; 8′ diam; has one ⁎ 8 m (place taken), one red one 9 m, the rest 12....14 m.	535
3095	IV. 64	7 34 20.9	107 49 16	○. An object which, owing to general bad definition to-night, and not being able to follow beyond its transit (being north of zenith), I could not perfectly make out. Certainly not a star; but if a Planetary Nebula, it is one of the less sharply defined ones.	675
3096	....	7 35 10.8	158 54 13	F; S; R; 15″; near 3 B stars	546
		11.1	53 31	p B; R; g p m b M; 35″	523
		13.5	54 13	p B; S; R; g m b M; 25″	673
		14.9	54 13	p B; R; b M; near 3 stars 11 m	557
		16.5	53 55	B; S; R; p s m b M; 30″; south of 3 st 11 m	545
3097	....	7 36 38.8	159 8 55	A double nebnla; v L; v F; position of centres = 40°; diameters 4′ and 3′ rnnning together, and having a star 13 m at their junction. (N.B.—The R A here set down seems to be that of the preceding neb.)	523
		50.9	8 32	F; v L; m E; 1st g, then p s m b M	673
		51.5	8 42	e F; v L; p m E; has a coarse double ⁎ (13 and 16 m dist = 12″) in middle.	546
		53.2	8 45	F; v L; m E; v s l b M; to a ⁎ 13 m, like a very faint atmosphere, about a nucleus $3\frac{1}{2}'$ l; $1\frac{1}{2}'$ br; pos of its extension = 39°.8. I think it has some sort of hooked appendage.—[N.B.—*In these three last observations the nature of the object appears to have been misapprehended. In ſ 523 it was evidently better seen and more satisfactorily made out.*]	545

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3098	....	7 37 22.9	113 28 30	A fine cluster, scarcely scattered, pretty rich, not much more comp. M. Nearly fills field. Stars 8....13 m.	768
3099	....	7 39 15.1	127 33 59	The chief star (4′ m) of an orange colour, of a very large and very diffused cluster of large stars, too loose to be a fit object for the ordinary magnifying power.	540
3100	....	7 40 33.0	116 55 49	☉. In the field with, and south of a cluster, and on a rich ground is the undefined object of ∫ 769. (See the next observation.) It is no doubt a very faint small round PLANETARY NEBULA, 4″, or, at the very utmost, 5″ diameter, and = in light to a star 11 m. There is an appearance of elongation, but this is probably owing to one or more e e S stars, as the field is full of such. It is dim, faint, and a very little hazy. All the other stars are sharp, and the definition to-night is perfectly good.	771
		34.5	55 43::	An object whose nature I cannot make out. It is certainly not a star, nor a close double star; but it is not round, and I should call it an oblong PLANETARY NEBULA, by reason of its decidedly marked though somewhat dim outline, were there not some suspicion of its being double, as if a very close and highly condensed double nebula. It is very small, and rather faint, 8″ long, 5″ broad, and equals a star 10 m. In a field with at least 60 or 80 stars, all sharp and well defined but this. [N. B.—The P D open to uncertainty, as the telescope rests on the gallery, and I cannot get it low enough for bisection. An estimated allowance of 2′ made for this.]	769
3101	....	7 40 43±	116 50 ±	A small but condensed cluster, class VII. p Rich, diam 3′. [This is the cluster referred to, as in the field with the Planetary Nebula.]	771
3102	....	7 41 33.9	110 52 41	Irregular cluster, p Rich, not m comp M, 10′, stars 12 m nearly equal. General middle taken.	677
3103	Δ. 535	7 46 8.7	128 7 27	Superb cluster, g b M, 20′ diam, much more than fills the whole field. Stars 10 and 11 m all nearly equal.	661
		21.0	5 43	Cluster 6th class; B; L; Rich, not very highly condensed in the middle. Stars very remarkably equal. All 12 or 13 m. Very few 14 m; none 11. A fine object.	540
		....	....	Viewed. A very beautiful large cluster, very rich; stars nearly equal, and 12 m; g b m; not m comp M; more than fills the field. [N. B.—*It is visible in the finder of the equatorial, and in the telescope of that inst appears as a fine cluster.*]	659
3104	....	7 46 33.6	160 59 5	v F; R; l b M; 25″	545
3105	....	7 47 48.2	117 25 22	Cluster 8th class. L; loose and straggling. A milky way cluster........	531
3106	VII. 10	7 48 1.3	113 51 16	A very rich milky way cluster, or mass of stars 10, 11, and 12 m; diam 20′. The neighbourhood is rich, but much less so than this cluster.	768
3017	VII. 23	7 49 19.9	119 37 29	Cluster 7th class. R; 5′ diam; stars 12 m...........................	771
	h. 479 Δ. 626	27.1	38 7	A R; p comp cluster of stars 11....13 m; 6th or 7th class; g b M; pretty rich; 7′ diameter.	531
3108	....	7 50 37.0	103 53 59	F; R; g b M; 30″; in a field full of stars	676
		42.8	54 38	p F; l E; in parallel; g l b M; 25″ long. [N. B.—Both observations correctly reduced. Perhaps 5ˢ mistake in one or other.]	687
3109	....	7 51 25.0	141 50 26	p F; R; v g p m b M; 25″	763
3110	....	7 54 52.6	101 49 51	F; v S; R; between 3 stars 13 and 14 m............................	687
3111	....	7 55 16.4	150 21 36	An orange-coloured ✱ 8 m, in middle of a L and magnificent cluster of perhaps 200 or 250 stars 8....16 m. Many of the larger magnitudes, and really a superb object. Very visible to the naked eye, &c.	524
		29.6	24 46	A double star in the same cluster....................................	524
		31.4	24 30	Place of a double star in a fine sc p rich cl of L st, which fills field, and may contain 150 stars, large and small. No other remarkable double star in it.	664
		34.6	23 39	Chief D star in a fine cl 7th class, stars 7....12 m. Fills field, and has outlying stars two or three fields preceding.	764
		61.5	21 16	A star 6 m, one of the chief of a large splendid cluster, coarse, filling field. 20′....25′ diam; stars 9....13 m.	681
		62.4	22 7	A star 6 m, in a superb, v L cluster. Rich and brilliant. In the northern part about 20ˢ; following this ✱ is a star 5 m, ruddy. Has two or three neat double stars in it. The whole region round is rich in large stars.	682

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3112	VIII. 30 h. 488	7 55 35.2	117 42 45	Cluster 7th class, distinguished among milky way clusters; p rich; bright. The star taken is the chief of a condensed hook in the following part.	771
3113	....	8 0 7.5	119 24 41	p comp cl sixth class; irreg R stars 13 . . . 14 m. One = 8′ m near the middle taken.	771
		11.7 :	24 56	Place (R A doubtful) of a ✻ 9 m; chief of cl p rich; irreg R; g l b M; 5′; stars 13 m. Belongs to milky way, but is a much more compressed part of it.	531
3114	VII. 11	8 2 42.6	102 19 48	A large, E, rich cl. Fills field; st 12 m ±; a B st (6 m) s f	676
		2 43.8	19 47	A fine rich cluster of stars 11 . . . . 13 m, which fills the field	757
3115	A S C. 1001	8 3 17.7	102 25 41	A fine nebulous star 6′ m, in the following part of the cluster VII. 11, and almost unconnected with it. The nebula is faint, but I feel confident that it is not the nebulous haze. [NOTANDUM.—Nothing more difficult than to *prove* a nebulous star of the 6th m and above.]	757
3116	Δ. 563	8 5 15.5	126 55 1	A cluster 8th class of about 20 bright stars in an oblong 8′ l; 3′ br	540
		21.4	51 48	Chief triangle of stars 9, 10, 11 m of an oblong irreg cl	661
		22.9	52 32	A bright group in full part of a B; not rich; irreg oblong cl; 6′ l; 3 or 4′ br	659
3117	Δ. 411	8 5 21.4	138 44 9	Chief star 7′ m, of a v L, loose, brilliant cl of v sc stars; 1 of 7 m, 2 of 8′ m; rest 9 . . . . 16 m. Fills more than field; 100 . . . . 150 stars.	526
		56.1	47 23	A L loose cl 8th class of L and S stars, full 20′ diam. Has in it about 20 stars above 11 m, and one neat double star. Place that of a star 8 m in the following part.	680
3118	....	8 10 6.1	116 56 43	p L; F; g l b M; in a field of about 60 stars; one of which = 9 m, and some others also of less magnitudes are involved.	771
3119	....	8 11 8.9	111 17 3	v F; v S; R; g b M; at least 60 st in field	768
3120	VII. 64 h. 503	8 11 44.2	120 6 57	Middle of cluster; not v rich; irreg R; not much comp; 10′ diam. Stars 12 . . . . 15 m, few very minute.	678
		46.8	6 40	A p rich cl of about 60 stars, 12 . . . . 13 m; irreg R; g l b M; 8′ diam....	531
3121	III. 902	8 13 23.4	102 47 0	v F; R; g b M; in a field full of Milky Way stars	676
		25.6	46 58	v F; R; g b M; in a field of 50 or 60 stars	687
3122	....	8 14 25.2	125 41 8	A double star, surrounded with very evident nebula which seems to belong to both stars.	786
		27.1	40 51	A double ✻, or a ✻ and a nebula, very close and involving the star. For pos dist, &c., see Catal of Double Stars. The field contains about 70 stars, of which 8 are 9′ m. I cannot be quite positive that the neb extends beyond the large star, or that the small one is not a mere condensation of it. However, I remain pretty well satisfied of its investing both.	541
		27.3	41 5	A neb attached to a star 12 m, but involving it	809
		27.9	40 50	A double star (h 4083) involved in p B nebula, which seems to belong to both stars; but of the two the smaller is more nebulous; diam 50″; in a p rich patch of the milky way.	540
3123	....	8 14 31.2	119 46 31	Cluster 7th class; R; p rich; insulated; 10′ diam; stars 12 m, nearly uniform.	771
3124	....	8 16 25.2	118 56 49	A milky way cluster 7th class; irreg fig; pretty much compressed in middle. Stars 10 . . . . 13 m; one 9 m.	531
3125	....	8 16 28.1	122 25 26	A small F cluster of st 15 m; 3′ diam; R; g b M; not very rich........	678
3126	....	8 24 18.6	157 33 28	F; R; g b M; 30″	557
3127	IV. 35 h. 513	8 25 33.5	105 33 35	A small cometic or fan-shaped wisp of nebula attached to a ✻ 13 m; there is a ✻ 7 m 10 sec foll; 2′ north.	675
3128	....	8 25 45.5	102 35 42	B; S; p s b M; E; between 2 stars	676
3129	II. 266	8 25 53.5	112 23 11	p B; m E; g p m b M; 80″ l; 20″ br	559
		56.9	24 55	B; L; v m E in pos 110°.3; p s l b M; 3′ l; 20″ br..................	532
		57.8	23 10	p F; m E; p m b M; 40″ l; 15″ br	558
3130	....	8 26 12.2	150 32 6	A cluster with a double star in it	778
		15.0	32 52	A double star, chief of a cluster 8th class of scattered stars, 6′ diam; not very rich or compressed.	682

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3131	....	8 29 22.0	130 4 54	A ✱ 8 m involved in a p B R neb, not concentric, the ✱ being somewhat to the northward of the centre, and the nebula not being quite equally dense on all sides, though most condensed in the neighbourhood of the star; diameter of nebula 2½′. (No doubt) Pl. VI. fig 12.	554
		22.2	4 57	A ✱ 9 m involved in neb; 3′ diam. In the milky way with multitudes of equal stars all round the neighbourhood, none of which are so affected. Sky quite pure, not the slightest nebulous haze. No doubt. The nebula loses itself imperceptibly, the star being (though excentric) yet in the most condensed part.	529
		22.8	4 55	A star 9 m in a decided and perfectly unequivocal nebula. It is not the nebulous haze, as other stars of equal and larger magnitudes are unaffected. Diameter 3′. I showed it to Mr. Maclear and another gentleman who saw it as described.	555
3132	VII. 63 h. 516	8 30 12.4	119 22 28	A fine L, rich, p m comp cluster; irreg E; 10′ l; 7′ br; stars 12 and 13 m nearly equal.	531
3133	....	8 31 47.5	124 9 55	A pretty comp cl of st; irreg triangular fig; much more comp than milky way around it; stars 13 m.	541
3134	....	8 32 53.5	144 31 28	p B; S; R; has 3 or 4 v S st close to it, preceding, which give it an elongated and resolvable appearance.	552
		53.8	31 36	p F; S; R; has 3 or 4 v S st near it, preceding. Observation taken by Mr. Maclear.	551
3135	III. 49 h. 521	8 33 10.9	75 7 2	p B; l E; p s m b M; precedes a star 10 m..........................	688
3136	....	8 33 20.5	135 37 39	A close group or small cluster of 12 or 13 large and small stars; place of a double star, the chief one.	527
3137	....	8 36 47.6	134 21 30	Cl VII class; p rich; p L; 12′ l; 8′ br; fig irreg; rather branching stars 11....14 m, not comp in M.	685
		49.3	20 15	A L, rich cl; irreg oblong; 15 or 20′ long	542
3138	....	8 37 1.3	136 35 56	Cl VI class; irreg R; g b M; 4′; resolved into distinct stars 14 m	527
		2.7	35 48	Cl irreg R; 3′; not m comp M; stars 13....15 m.....................	553
3139	....	8 37 35.6	104 40 53	v F; v S; R; b M; near a ✱ 15 m................................	687
3140	....	8 40 ±	143 21 ±	Cluster VIII class. A L, poor, loose cl of stars, 10....13 m	440
3141	Δ. 489 or Δ. 490	8 40 1.9	131 16 0	A pretty rich, irreg R cl; not m b M; st 12....13 m; place that of the general middle.	554
3142	....	8 40 5.6	138 10 1	A cluster 8th class, not rich, nor m comp; 8′ in diam; irreg R; stars 13 m	680
3143	....	8 49 22.2	148 34 34	e F; S; R; p s l b M; difficult, but certain	543
3144	....	8 49 32.4	114 1 31	p B; R; v g p m b M; borders very dilute............................	559
		34.7	0 50	F; S; R; g p m b M; 20″	558
3145	....	8 54 27.9	135 13 57	e e F; L; v v m E; an extraordinary long narrow ray of excessively feeble light; pos 19° ±. The n f end is brighter and narrower than the sp. At least 20′ long, extending much beyond the limits of the field. A star 8 m, andone 8′ m near it. See Pl. V. fig. 12.	553
3146	....	9 0 7.5	112 58 10	e F; l E; l b M; rather a doubtful object	532
3147	....	9 3 25.6	104 7 53	B; E; p s m b M; 40″ l; 30″ br..................................	687
3148	I. 59 h. 571	9 4 45.3	113 27 51	B; p L; m E; nearly in parallel; p s m b M........................	559
		47.4	30 0	B; L; m E; p g m b M; 4′ l; 90″ br; pos = 63°.7	532
3149	....	9 6 1.8	131 44 5	O PLANETARY NEBULA; as in ∫ 554; observed with Mr. Maclear and another gentleman.	555
		2.9	43 54	O PLANETARY NEBULA; p F; exactly R; equal to a star 9 m, but of a dull light. At first I was inclined to think it double, but with 320 it exhibited a uniform round disc; nor did a friend to whom I showed it see any division. Stars to-night perfectly well defined. In a field with leading stars, of which a diagram was made.	554
		4.3	44 42	p B; R; 6″ diam; equals in light a star 9′ m; a very careful and good observation.	810
		....	....	Viewed past meridian. It occurs in a field with about 40 stars. Diam 4″ or 5″ at the utmost; 10″ is too large certainly. Very like that of ∫ 771, (h. 3101) But now the night is good and it bears magnifying. With 320 the disc is dilated into a dim hazy round nebula; yet there is a peculiarity in its appearance which completely separates it from all nebulæ of the same size. A very remarkable object.	772

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3150	....	9 6 10±	157 14 32	v F; v S; m E in pos 105°	537
3151	II. 505 h. 580	9 8 13.0	105 35 48	p B; m E; p s v m b M; 40″ l	575
3152	Δ. 265	9 8 24.8 :	154 9 56	⊕; e comp p g v m b M; up to a perfect blaze; diam in R A = $26^{s}.8$; stars 16 m; equal. R A doubtful; the mirror being in a spring case (afterwards disused).	430
		38.7	9 56	Superb ⊕; diam = 5′; v m comp M almost to a nipple. Stars innumerable and very small; 13 . . . 15 m.	550
		41.0	9 51	A truly beautiful and delicate ⊕; diam in R A = 45^{s}, that of the most compressed part 15^{s}; g v b M; all finely resolved into perfectly equal stars like the finest dust, which are seen with the left eye without effort, but the right requires to be somewhat strained to discern them. Runs up to a blaze in the centre.	773
		42.4	10 0	⊕; 4′ or 5′ diam 1st p g, then p s b M; all resolved into stars 16 m and a few 15 m. A neat D star foll dist 1 field	433
3153	III. 242	9 8 43.0	112 54 51	F; R, or v l E; g l b M; 25″	559
3154	Δ. 564	9 9 8.6	125 53 51	A very curious object which reminds me strongly of Messier's No. 46 and IV. 39. It is a rich cluster of the VI class; stars 12....14 m; about 8′ diameter; g p m b M; all but a sort of vacuity, in which is situated a p B, R, neb; 40″ diam; of a character approaching to planetary, having its edges shading off very rapidly, and being but very little brighter in the middle.	787
		9.4	55 5	p B; R; v g v l b M from the edge, where it fades off very suddenly; being all but a planetary nebula. Situated in a sort of vacancy in the preceding part of a fine rich cl of st 11....15 m, which nearly fills the field. It is a fellow object to Messier's 46th, with its enclosed planetary nebula, IV. 39. Pl. V. fig. 8.	809
3155	....	9 9 20.9	116 7 20	e F; attached to a * 11 m; somewhat doubtful	563
3156	....	9 10 20±	158 56 17	p F; v S; R; g l b M........	537
3157	....	9 11 18.9	158 38 22	F; R; g l b M; 40″. Nearly on merid with β argus........	537
3158	....	9 11 49.1	152 21 23	F; v S; between two st, in a field full of milky way stars. No doubt of the nature of the object.	682
3159	....	9 11 51.1	127 18 7	v F; S; R; attached to a star 12 m, s f	540
3160	....	9 12 43.0	129 49 50	⊕; e F; R; v g l b M; resolved into v S, but not very numerous stars; 2½′ diam. It is rather a cluster of the 6th class than a ⊕.	810
3161	....	9 15 49.1	112 25 51	B; S; R; p g m b M; the borders very dilute	559
		50.9	28 0	p B; S; R; v l b M; 15″........	532
3162	....	9 16 21.4	140 22 44	Cluster class VIII. Place of a small compact knot of st........	556
3163	....	9 16 33.3 :	147 35 23	O. PLANETARY NEBULA. R A doubtful, being far below the *f*. Pos of adjacent star = 58°.8; 57°.3; mean 58°.0. Set microm to 51.1, the measure of last night, and carefully examined. It cannot pass as a measure, and must have been a mistake for 56.1 or 61.1; measured to-night with the utmost care; quite calm.	552
		35.2 :	35 21	O. Perfectly sharp; exactly R; not the least hazy or mottled. At 1½ diam distant from the edge (or taking 12″ for the diameter of neb at 24″ dist from centre) there is a star at pos = 51°.1; well examined with Mr. Maclear. It bears 320 well, and is quite sharp and uniform with that power. R A imperfect being out of the regular *f*.	551
		37.6	35 35	O. Beautifully round and sharp; just like a small planet 3″ or 4″ in diam at the utmost. Position of the attendant star = 59°.3, 57.8; mean 58.5; dist 2½ diameters from centre. Shown to Captain Henning.	684
		38.5	35 10	O. R; = * 8 m; R; quite uniform in light; quite sharply terminated. Its diameter transits over a wire set to 60° (30 from parallel) in $4^{s}.03$, by a mean of 5 transits; has a * adjacent; pos = 60°.7; dist = 1½ diam from the edge. About 40 stars in the field, among which two are 9 m. [*This would give* 16″ *but the wire was much too thick.*]	664
		☞		☞	

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
		38.6	34 55	☉. The finest PLANETARY NEBULA I ever remember to have seen for sharpness of termination; 3″ diam; exactly R; no more haziness about them than would be about a star of the same magnitude to-night (which is a favourable one). Light, a pale white = ✱ 9′ m. Pos of companion ✱ = 59.8; 57.7; 58.4; mean 58°.6; ✱ = 15 m. A very remarkable object. Showed to Stone, who distinctly perceived the total difference of appearance between it and a star 9′ m very near it. A second companion ✱ suspected (at about half the distance of the 1st by diagram, and at an estimated position of 330° ±) among multitudes of L and S stars.	435
		38.8	35 13	☉. Diameter 8″; perfectly uniform in light; sharply terminated, just like a small planet. Position of attendants star = 60°.7, by mean of 2 measures; dist 1½ diam; 14th mag.	764
		39.2	35 41	Quite sharp and round; 8″ diam; = a ✱ 8 m; pos of a star 14 m; dist 1½ diam from edge = 60°.8, by a mean of 3 measures. There are 56 stars in field with it, of which the largest is 9′ m.	543
		....	....	Observed with Mr. Maclear, April 2, 1834, out of the meridian. Quite round, well defined, and about 3″ or perhaps 4″ diam. Much better seen (between clouds) than last night. (ʃ 435.) The small star is still 1½ diam from edge. It has therefore not moved perceptibly, and is therefore not a planet.	
3164	....	9 18 15.3	123 21 55	A v F, S, cluster, class VI; v g l b M; resolved so as to see the stars which are 15 m; almost to be called a v F, large nebula.	787
3165	....	9 18 46.3	111 0 55	e e F; 50″	770
3166	....	9 18 52.7	117 17 23	p F; R; s m b M; very dilute at edges; 30″	564
		54.8	18 2	v F; R; g p m b M; 15″	771
3167	....	9 19 20.4	114 4 0	F; S; R; b M; 15″	532
3168	....	9 19 28.8	153 4 51	F; S; R; p s b M; 15....20″; has 3 stars near, prec	568
		31.8	4 23	F; S; R; g p m b M; 20″	773
		....	5 6	F; S; R; g b M; near a bright ✱. (N. B.—The R A by this obs comes out 12ˢ.9; but the mirror having been put by inadvertence into a case with springs, the zeros fluctuated, and the observation is entitled to no weight, the collimation having been neglected.)	430
3169	....	9 21 47.0	145 22 1	F; p L; R; g l b M; 80″. At least 80 stars in field	552
		....	22 57	No description	784
3170	....	9 22 57.6	119 38 58	F; S; v l E; p s b M; 15″. Very dilute at the edges	564
3171	....	9 24 20.0	142 9 ±	Cluster of loose stars; p rich; stars 11 ... 15 m; has rather a vacancy in the middle; fills about ⅗ of field.	439
		55.5	11 56	Cluster, class VII.; p rich, L, and fine. Stars 10 ... 13 m, in irregular lines and tracing. The chief ✱ 10 m, taken near the most compressed part.	763
3172	....	9 26 26±	110 6 ±	e F; S; R; the preceding of two	770
3173	III. 597	9 26 35.9	110 10 13	v F; p L; l E; the following of two	770
		42.8	9 54	F; l E; g l b M. This obs makes the degree of N P D 109. But as there can be no doubt of the identity of this neb with my Father's III. 597, his degree (110) is preferred. The right ascensions in this sweep are bad.	561
3174	....	9 27 2.5	165 52 54	p F; p L; R; g b M; 45″	782
3175	....	9 27 7.6	105 38 52	p B; R; 20″	675
3176	....	9 27 56.7	179 34 14	Neb Polarissima Australis. F; R; g l b M; 25″. Situated nearly half way between a ✱ 10 m south of it, and a small triangle of st 11, 13, 13 m north. Being so near the pole, the R A may err many minutes of time.	781
3177	....	9 27 57.6	142 41 26	A pretty rich cluster, 8th class; a D ✱ (one of the chief) taken	763
3178	II. 556	9 28 48.4	110 22 15	p F; R; g p m b M; 40″. The obs makes the degree 109, but 110 agrees with my Father's place, and with that of ʃ 561, and is preferred.	770
		52.6	22 34	p B; v S; g m b M; l E; 25″ l, 20″ br. (R A not good.)	561
3179	....	9 29 ..	136 11 ..	This is about the middle of an enormous cluster of a degree or degree and half in diameter, very rich in stars of all magnitudes, from 8 m downwards, which merits registry as a sort of telescopic Præsape. It may perhaps be regarded as a detached portion of the milky way, which is here very much broken up.	776
3180	....	9 29 52.6	111 16 6	F; S; R; g l b M; 20″	559
		53.0	17 40	F; S; R; g l b M; 2 or 3 small stars near	532

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3181	....	9 31 5.5	74 18 5	v F; R; 20″. Another suspected 6′ south, nearly on the same meridian ..	688
3182	....	9 31 ..	74 24 ..	Suspected nebula. (N.B.—These suspicions have been so constantly verified on re-observation, that I have little hesitation in registering it as an object in the catalogue.)	688
3183	Δ. 397	9 34 12.6	139 33 26	A small p comp cluster; irreg fig; 4′ in extent. Not rich stars, 13 m	680
3184	....	9 35 42.3	133 58 11	A cluster of about 20 stars 11 m, and 2 of 10′ m, forming an oblong nearly in parallel; place of preceding ✻ 10′ m.	774
3185	III. 289	9 35 43.8	109 41 45	p B; R; b M; r	770
3186	....	9 37 37.2	107 36 14	F; R; g b M; precedes a coarse D star	675
3187	....	9 38 4.7	110 48 34	v F; S; has a ✻ 20 m 1′ following	561
3188	V. 50	9 38 13.2	120 24 26	F; v L; first v g, then v s m b M, to a nucleus (exactly like Halley's comet) as now (Feb. 16, 1836) seen in the equatorial; R; diam in R A = 24ˢ.0. Has a ✻ 11 m, s p just at the edge.	678
		14.6	24 48	p B; v L; R; v s l b M, to a pretty distinct round nucleus 4″ diam. Diam of nebula = 15ˢ of time. The nebulous atmosphere extremely dilute. A very remarkable object.	535
3189	....	9 38 21.4	143 59 49	Cluster VIII. class; at least 20 st 11 m and upwards, and many smaller ..	784
3190	....	9 38 51.4	119 39 48	F; R; 30″; attached or contiguous to a ✻ 12 m; pos = 320° ± by estimation from diagram.	564
3191	....	9 39 ..	139 39 ..	A small irreg cl of a long triangular diverging figure; contains perhaps 50 stars 12 ... 15 m. Observed for Δ 397, and place only rough. Possibly the same object with ʃ 680, No. 27, which see above (No. 3183).	442
3192	....	9 41 34.6	110 57 1	e F; v S; R; north of a ✻ 9 m........	559
3193	....	9 41 53.1	108 23 19	F; S; R; l b M; 15″........	561
3194	....	9 43 2.4	145 37 18	irreg R cl, 8′ diam, of 50 or 60 st, 11 and 12 m. In the milky way, but sufficiently rich and distinct to be registered as a cluster.	552
		2.7	37 28	The ✻ B 2686, in the midst of a great number of stars 11 and 12 m......	784
3195	....	9 43 45.0	116 13 45	F; R; l b M; 30″	563
3196	II. 98	9 43 46.6	72 31 34	⊕; F; L; R; v g l b M; 2½′; resolved with left eye	688
3197	....	9 44 15.6	151 33 51	The chief star 10 m, of a cluster class VIII. of sc st 10′ diam. It is on the borders of the milky way.	777
3198	....	9 45 13.8	107 50 39	v F; R; l b M; 30″. (R A correctly reduced.)........	561
3199	....	9 45 40.8	116 32 1	p F; R. R A precarious; a hurried observation........	562
3200	III. 600	9 46 14.8	72 45 38	v F; l E; g b M; 25″........	688
3201	....	9 46 20.1	116 29 31	p F; S; R; g b M; 20″	562
3202	III. 272	9 46 25.7	107 50 19	p F; L; R; g b M; 50″	561
3203	....	9 46 53.7	117 30 13	p B; S; R; v s m b M; has a ✻ 10 m almost contiguous; pos from neb = 203°.8.	564
		56.3	30 9	p B; R; 25″; attached to a ✻ 12 m........	771
3204	III. 601	9 47 0.9	72 21 37	e e F; R; 20″	688
3205	....	9 48 11.8	163 9 50	F; L; irreg R; g l b M; 3′; many v S stars near and in it........	547
3206	III. 273	9 49 21.5	108 32 20	v F; R; g l b M; 40″........	770
		22.6	32 19	v F; E; g l b M; 60″ l; 50″ br	561
3207	....	9 49 41.7	74 45 26	v v F; forms an appendage to a ✻ 14 m; a ✻ 11 m follows........	688
3208	....	9 50 6.8	107 21 55	e F; S; R; 15″	675
3209	II. 268	9 50 42.7	116 6 51	B; R; g m b M; 30″........	562
3210	....	9 51 20.4	119 33 18	v F; S; R; close to a double star. Requires verifying	564
3211	....	9 51 23.7	116 19 35	v F; S; R; attached to a ✻ 13 m, s f........	563
3212	....	9 51 25.7	108 42 24	v F; v S; R. P D liable to some uncertainty........	561
3213	....	9 51 46.3	123 25 13	p B; S; R; p m b M; between 2 st 13 m	541
3214	....	9 51 58.8	117 30 17	p F; R; 60″; has 2 or 3 v S st involved, and a ✻ 8 m; 2′ dist, foll......	771
3215	II. 293	9 52 14.0	108 49 19	p B; p S; the preceding of two	561
3216	....	9 52 33.6	120 44 19	F; L; E; v g v l b M; 3′ l; 2′ br	678
3217	....	9 52 37.5	108 49 24	e F; R; l b M; follows II 293. (Place somewhat uncertain.)........	561
3218	....	9 53 7.9	120 51 3	p B; R; 30″; g p m b M	678

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3219	....	9 54 39.2	143 58 19	A rather remarkable S oval cl of v S stars, with a train of large stars running out of it, s p.	440
		46.5::	57 ::	A small close clustering knot of st 13....16 m; oval; a great train of st 12....13 m on the sp side	439
3220	....	9 54 54.9	120 51 32	F; S; R; g b M; 15″...	678
		60.8	51 20	F; S; R; l b M; 15″...	535
3221	....	9 55 17.5	115 20 45	F; v L; v m E; 10′ l; 90″ br; place of a ✱ 12 m in or near the centre	563
		18.0	20 51	v F; v L; 12′ l; 2′ br; l b M; pos of axis 82°.3. See Pl. V. fig. 9.	562
3222	....	9 56 41.7	117 37 34	e F; L; 3′; makes an obtuse angled triangle, with 2 st 8 m; one nearly on the parallel, the other nearly north.	771
3223	I. 163 h. 668	9 56 44.1	96 54 13	v B; L; v m E; v s v m b M; observed among clouds................	697
3224	Δ. 297	9 56 54.9	149 11 19	An enormous congeries or clustering region of stars 2 or 3 fields in diameter, constituting a decided cluster. Stars 9....14 m, the larger magnitudes predominating. There must be many hundreds. The place taken in the centre of a bright equilateral triangle.	543
		74.6	21 33	The chief ✱ 9 m of a v L, loose, brilliant cluster, which fills many fields ..	432
		91.8	21 30	The chief ✱ 8 m of a v L, loose cl of stars, 9....13 m, which fills many fields. [*As both this and the last observation are distinctly written and correctly reduced, no doubt they belong to two distinct and nearly equal stars on the same parallel.*]	435
3225	....	9 57 56.0	123 23 55	F; R; g b M; 40″...	809
3226	....	9 58 36.8	108 24 54	F; L; R; l b M; has a fine double ✱ exactly S......................	561
3227	....	9 58 52.1	119 5 42	p F; R; v g b M; 25″	771
		55.6	7 18	F; R; g b M; 20″	564
3228	....	9 59 48.8	129 36 45	○. PLANETARY NEBULA, with a ✱ 10 m in centre; v B; very well defined, and perfectly equable all over in light, there being no condensation up to the centre. The star is sharp; the nebula *velvety*, or like infinitely fine dust; a star 14 m at a distance rather more than a radius of neb from edge (by diag); has its position from centre = 333°.8.	810
		51.7	36 7	PLANETARY NEBULA; v L; v B; elliptic; has in it a ✱ 9 m somewhat excentric. Its light is exactly equable, *i. e.* not increasing towards the middle; yet I cannot help imagining it to be closely dotted. It is just like a star out of focus in certain states of the mirror and atmosphere. Three stars near, a = 9′ m; b = 9′ m; c = 14 m. A very extraordinary object.	554
		53.6	36 33	Well seen, as described in ∫ 554, and shown to Mr. Maclear and another gentleman. The star in the nebula is 9 m, very sharp, full, and distinct. Six stars 9′ m in the field; one companion = 13 m.	555
		55.9	36 2	A perfectly well defined bright elliptic disc, diam in R A = 4s.0; major axis : minor : : 5 : 4. In the middle is a ✱ 9 m, which is quite sharp, but which I think has a small disc. This ✱ is somewhat excentrically placed. See Pl. VI. fig. 9.	772
3229	....	10 1 ..	158 33 ..	B; R; b M; place only a very rude approximation.....................	538
3230	....	10 1 8.8	118 13 37	v F; l E; 25″	771
3231	....	10 1 23.0	156 32 54	p B; R; g b M; 40″	556
		23.9	32 39	p B; R; g b M; 40″; south of a ✱ 13 m	557
3232	....	10 1 40.4	97 39 6	F; v s b M to a ✱ 16 m; diam 1′ or 1½′; s p the ✱ g Sextantis, which occasioned its being taken by mistake for Halley's comet, and the consequent loss of that comet.	697
3233	....	10 4 6.7	120 47 15	v F; E; 30″; has a ✱ 8′ m s p	535
		....	....	Looked for but not found by this. However, as no R A is noted, perhaps it was looked for too late. The obs of ∫ 535 is positive, and correctly reduced.	678
3234	....	10 5 26.0	169 35 7	F; l E; v l b M; 25″; has a ✱ 15 m in it, excentric..................	549
3235	....	10 6 46.8	116 50 51	e F; S; R; precedes 2 B st (one very near it)........................	562
3236	....	10 6 56.7	118 2 19	p B; L; m E; g p m b M; 3′ l	771
		57.0	2 3	B; L; m E; g v l b M; 2′ l; pos 50°.3	564
3237	....	10 7 56.3	104 57 2	p B; p L; g p m b M; seen through haze	687

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3238	Δ. 445	10 10 38.0	135 32 54	⊕; irreg R; g b M; not v m comp; 6′; res into st 13....15 m........	695
		40.4	33 24	⊕; irreg R; 7′ diam, but the outliers extend to at least 10 or 12′; g p m b M, but not very much compressed; all resolved into stars 13....16 m.	776
3239	....	10 10 38.4	147 6 5	v B; v L; 10′ l; of a concave or crescent form, sharply terminated inwards, fading away outwards. In a field of about 80 stars. The place is that of a ✱ 13 m, about the middle of the crescent, or rather nearer the head. (See fig. 3, Pl. IV.)	543
		41.7	8 9	p B; v g b M; of a falcated or semi-lunar shape, extending over ¾ of the field. The place is that of a double star in its vertex or southern extremity.	552
		42.9	8 9	Place that of the double star near the cusp of the great falcated nebula, whose extent in P D is = 1.3 rad of field = 9′.75. In a rich field. A clustering group follows.	784
		46.4	4 30	A v L and very remarkable nebula, which is brighter to the s f part, and dies off to the n p, having a curved form and forked tail. In the head of it is a double star. The neb is p B; v L; fig. irreg; 8′ l, 4′ br. Among a vast number of milky way stars.	435
3240	....	10 10 41.9	115 51 20	p B; S; p m E; b M; 25″ l. This obs makes the minute of R A = 11, but ʃ 562 makes it 10, which is preferred, that the observation may not be lost in future by looking out too late.	563
		42.4	51 21	p B; E; g b M; 25″	562
3241	....	10 11 4.2	170 1 46	Planetary Nebula; R, or v l E; a very little hazy at the edges, but still pretty well defined with 240. Viewed long and with much attention, being a very remarkable object. I am positive of the existence of two brighter portions near the edges. (See fig. 2, Pl. VI.) Companion stars *a* = 11 m, pos = 274°.7; *b* = 13 m, pos = 271°.5; *c* = 14 m, 204°.8. The star *a* precedes the centre 14 sec, which is also the diameter in R A of neb.	780
		9.1	0 49	○; p B; not quite uniform in its light, having two brighter patches; l E towards a ✱ (a); slightly hazy; diam = 15 or 18″ (in R A $13^s.0$ of time). Pos of *a* = 265°.7, dist = 0.7 diam from edge, 11 m; of *c*, pos = 210.7, dist = 1¾ diam from edge. [N. B. 13^s *in time* = 33″.74 *in arc.*]	549
3242	....	10 12 18.0	151 49 56	○; Planetary Nebula; delicate, exactly round, = ✱ 10 m a little dim at edges; white; with 320 considerably hazy. In field with at least 150 stars.	777
		20.5	49 18	○; perfectly R; very well defined, with a perfectly uniform light, not at all mottled; = a ✱ 10 m, of which brightness there are 5 or 6 more in the field, and not less than 150 others less bright. Examined by both Mr. Maclear and myself with 240, which shows it proportionally magnified; quite round and planetary; a little hazy at the edges, but not more so than is due to the decidedly bad definition of the night, and the imperfect figure of the mirror, which has been injured by careless polishing on too soft a polisher.	778
3243	....	10 14 0.0	123 23 59	p B; v L; v l E; p s l b M, to a centre; diam 2′	541
3244	....	10 14 7.4	123 50 27	v F; R; p g m b M; 40″	571
3245	Δ. 386	10 15 ±	140 52 ±	A group of 9 L, and a few sc small stars	438
3246	IV. 10 h. 710	10 15 53.5	71 59 1	A star 9′ m, affected with a nebulosity, chiefly on the following side. Imperfectly seen in the haze of a S E drift.	688
3247	....	10 16 26.5	110 55 56	e F; S; R; 15″; near a ✱ 12 m	559
		28.9	55 50	e F; S; R; near a star	558
3248	IV. 27	10 16 33.1	107 46 55	Planetary Nebula. Viewed past merid; place from Piazzis' Catalogue. Somewhat hazy, with a slight nebulous atmosphere. Colour a decided blue; at all events a good sky-blue. Elliptic; pos of axis = 140°; diam in R A = $2^s.5$. Has 2 companion stars (a) pos = 173°.0; (b) pos = 137°.8.	770
		33.7:	46 39	○; of a decided pale blue colour, but not so full a blue as the planetary nebula $11^h\ 42^m$ 146° 14′; oval; pos of the longer axis = 135° ±; 30″ l, 25″ br; uniform and v B; but not quite sharp at the edges.	561
		37.5	46 48	A very fine, large Planetary Nebula, 25″ in diam, a little elliptic; v B; uniform, but owing to a hot wind too ill defined for detailed examination.	560
		38.0	46 40	○; v B; decidedly elliptic; a little dim at edges; colour very decided pale blue; diam in R A = $3^s.0$. Pos of longer axis about 130°; pos of the nearer of two companion stars = 172°. (Plate V. fig. 5.)	675
3249	....	10 16 35.3	121 36 25	F; p m E; g l b M; has a ✱ 11 m n p	678

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3250	....	10 18 32±	146 61 30	A curious object. Stars involved in evident nebula. R A only observed to the nearest minute.	435
		....	146 57 ±	A decidedly nebulous group. No R A, and P D very rough, being observed 5 or 6 fields past meridian.	784
		....	146 59 4	There is a nebulous appearance, which merits re-examination. Observed much past merid, and no reliance on the P D.	436
3251	....	10 18 46.2	124 5 32	e F; p L; R; v g v l b M; 60″	541
3252	....	10 19 ±	129 5 ±	p B; R; p s b M; 30″; has a * 13 m n f	540
		19 4.8	4 38	p B; R; g p m b M; 25″	574
		6.2	4 20	p B; R; g b M; 40″. Either a double neb, or has a v F star 45° n f....	555
		7.0	5 15	p B; R; g p m b M; 25″	573
		9.0	4 24	B; p B; R or v l E; first v g, then p s b M; 90″ or 2′ diam. [N.B.—The nebula has evidently been seen to better advantage in this than in any of the foregoing observations.]	810
3253	....	10 20 28.9	149 48 42	A very compressed knot or cluster of milky way stars, 4′ in diameter, somewhat insulated from the rest. Stars . . . 15 m.	543
3254	....	10 20 35.3	133 1 43	p B; R; S; g b M; 20″	686
		36.4	1 59	B; R; g m b M; 25″	542
3255	....	10 21 7.2	124 47 32	e F; v S; R. The first of a group	541
		7.9	47 47	v F; R; p s b M; 10″	448
		12.1	46 ±	v F; v S; R; s b M; 10″. The preceding of a group	447
3256	....	10 21 12.9	124 43 47	v F; R; p s b M; 12″. The second of a group	448
		14.7	45 6	F; S; R; 15″	541
		18.6	43 0	v F; S; R; s b M; 12″	447
		18.8	44 7	F; R; p s l b M	572
3257	....	10 21 26.4	124 43 7	e F; l E; l b M; 5″. The third of a group	448
		28.7	45 1	v F; v S; R; near a star 12 m	541
		31.1	42 40	e F; v S; R; s l b M; 6″	447
		32.0	43 7	v F; R; p s l b M	572
3258	....	10 21 46.6	133 47 3	F; S; R; 15″; entangled among 2 or 3 st, but is certainly a nebula......	686
3259	....	10 21 48.7	124 44 18	F; R; p s l b M; 12″. The 4th and last of a group. (The minute by this obs is 22, but both the diagram and the obs of ʃ 541 prove this to be a mistake for 21.)	448
		52.6	45 0	e F; e S; R; l b M; 10″. The 4th and last of a group	541
3260	....	10 21 51.6	133 19 58	e F; S; R	542
3261	....	10 21 57.1	133 15 23	F; m E in pos = 280° ±; p s b M; 20″	542
3262	....	10 22 13±	124 29 ±	e F; v S; R. By a diagram made out of meridian in which 4 nebulæ are delineated, two of them being those determined in ʃ 446 Nos. 6 and 7.	571
3263	....	10 22 16±	124 30 ±	F; S; R. By diagram, &c., as in the case of the nebula immediately preceding, to which this is contiguous.	571
		18±	30 ±	Place concluded from those of the nebula, Nos. 6 and 7 of ʃ 446, by the aid of a diagram made out of meridian, in which also 4 nebulæ were seen, but of which only 3 are identifiable with those of ʃ 571; the small nebula contiguous to and preceding this, not having been seen owing to haze, and a 5th more remote and brighter, being now for the first time laid down.	572
3264	....	10 22 20.1	124 20 23	F; S; R; b M; 15″; one of a group of 3 or more	446
		....	21 37	F; R; 20″	572
		....	....	Observed also in ʃ 571 and 572; which see above	
3265	....	10 22 25.0	124 29 53	F; S; l E; b M; 15″; one of a group of 3 or more	446
		....	32 ±	p B; p m E; p m b M, as per diagram, &c., taken out of meridian. See Remarks on the 4 nebulæ immediately preceding. Seen also in ʃ 571.	572
3266	....	10 23 11.9	125 51 49	F; l E; p s b M; 20″	540
		15.3	52 33	F; L; R; p s l b M; 60″	574
		....	....	Seen past merid; too late for place or description	573
3267	....	10 23 38.6	129 4 40	F; S; has a * 8 m, n p	555
3268	....	10 24 6.0	129 4 16	F; S; R; s p a coarse double star	554
		8.0	5 25	F; R; has a double star n f	555

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3269	....	10 24 13.0	123 58 52	e F; E; g l b M; 60″ l; 40″ br	447
3270	....	10 25 33.6	116 34 37	p F. The first of a group scattered over more than one field	689
		37.1	35 26	p B; E; g b M	562
		38.6	34 28	p B; R; g b M; 40″	564
		39.2	35 20	p F; S; R; g b M; 15″	563
3271	....	10 25 35±	135 22 50	p F; S; R; g b M; 25″. R A coarsely taken by an auxiliary star	776
3272	....	10 26 26.0	124 25 17	e F; R; 15″	572
3273	III. 55 h. 727	10 27 35.1	74 57 2	p F; S; R; g p m b M	688
3274	....	10 27 57.6	121 57 48	e F; S; R	678
3275	....	10 27 59.9	121 29 25	v F; S; R; 15″	535
3276	....	10 27 ±	147 19 —	A fine, bright, rich, not very L cluster. (Equatorial zone review)	
3277	....	10 28 14.0	116 17 1	v F; S; R. The 2nd of a group scattered over more than one field	562
3278	....	10 28 16.9	116 43 22	e e F. The 3rd of a group. [P D by MS 38′; *but there is some confusion in the entry, the figures being roughly written over, and no doubt being left by the diagrams that the most visible writing is 5′ wrong, and that 43 is the true minute.*]	689
3279	....	10 28 22.9	116 33 52	The 4th of a group	689
		23.5	32 28	One of a group; 7 of which were seen and laid down in a careful diagram for identification.	564
		24.6	33 25	F; S; R	563
		24.6	34 31	F	562
3280	....	10 28 36.6	116 38 38	A double nebula, or rather two distinct nebulæ near together. By diag, both p L, R pos about 10° n p or s f, and nearly equal. It is not stated which was taken. Presumed to have been the preceding.	564
		36.7	39 0	The preceding neb of a double neb; 2 or 3 stars also near	563
		35±	37:31	B; L; double; a hurried obs, R A taken only to the nearest minute, and a mistake (rectified in the reduction) of 10′ committed in the P D.	562
3281	....	10 28 45±	116 40 ±	The following neb of a double one. Place deduced from that of the preceding one by a measurement of the diagram.	564
3282	....	10 29 3.3	116 44 25	v F; p m E; the last of 4 in the field at once with two stars 6 m near them, one above and one below them (which serves to identify the object beyond doubt), P D only correct to the nearest minute.	563
		5.2	....	F; E; g b M. No P D taken, a hurried observation, and the wire mistaken (rectified in reduction). This nebula is the 7th of the group in fact, though in this observation called the "5th or 6th."	564
3283	....	10 29 15.4	116 47 31	The 8th of a group	562
3284	....	10 29 33.4	116 42 47	p F; S; R; b M. The last of a group of 9 neb	689
		36.0	43 8		564
		36.5	44 30	v F; R. [N.B.—*This numerous and very interesting group has been made out by a careful collation of diagrams made in ƒ 564 and 689, for the purpose of identification, from which it appears that though in each diagram only 7 were seen and laid down, yet there are in reality at least 9 in the whole group. Several mistakes of reading appear to have been committed in the hurry of observation unavoidable in attempting to determine at once so many objects; but, on the whole, the group appears to be satisfactorily made out.*]	563
3285	....	10 29 45.1	130 45 0	F; R; g l b M; 60″	810
		48.8	45 15	v F; p L; p m E; g v l b M; 2′	554
3286	Δ. 322	10 30 54.6	147 44 30	A double star involved in nebula, which is one of the outliers of the great nebula about η Argus. It extends to a ✱ 6.7 m half a field distant southwards, and almost as far north; p B; irreg fig; fine object.	435
3287	Δ. 355	10 31 49.3	143 14 45	The chief ✱ (9 m) of a poor cluster of 20 or 30 stars	438
3288	....	10 32 4.4	125 9 56	e F; v S; m E; appended like a tail to a ✱ 15 m	541
3289	....	10 32 18.9	116 52 21	v F; p L; l E; g l b M	562
3290	V. 7	10 34 34.8	74 13 49	v F; L; R; v g v l b M; 3′ or 4′ diam. A soft globe of light, resolvable with the left eye.	688

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3291	....	10 34 59.6	125 28 11	Not v F; R; s l b M; 15″. The first of 3	448
		61.3	28 46	B; m E; a nucleus with v F arms nearly in merid	541
		61.9	27 7::	p F; R	572
		64.3	28 14	p F; S; R; v s m b M to a ✱ 12 m	446
3292	....	10 35 17.3	125 28 21	v F; S; l b M; 8″. The 2nd of 3	448
		17.9	31 10	p B; p L; R; p s b M; 40″	541
		19.2	28 59	v F; S; l E	446
		23.4	27 7::	e F; R	572
3293	....	10 35 48.7	125 28 45	F; v S; R; close to a v S star; the last of 3	541
		50.7	30 27	v F; l E; the 3rd of a group	572
3294	....	10 37 44.8	132 49 18	F; E; g b M; close to a ✱ 6.7 m. The minute of R A doubtful. The written record makes it 47; but as this is impossible from the context, 37 is assumed.	686
3295	Δ. 309	10 38 24.8	148 46 57	The ✱ η Argus, with the Great Nebula about it, of which see the monograph and detailed description.	432
		28.7	47 40		435
		28.8	47 21		543
3296	....	10 38 51±	129 8 ±	p B; R; b M. Out of limit of *f*. Place rough	540
		59.8	7 26	F; R; g l b M; 30″	810
		60.2	8 18	v F; S; R; g l b M; 15″	574
		73.8	7 5	v F; R; g l b M; 25″. [*No doubt of a mistake of* 10 *seconds in reading the chronometer.*]	573
3297	....	10 39 12.2	113 32 11	F; p L; R; l b M; 50″	559
		14.4	32 10	F; p L; irreg R; g l b M; 40″; ☾	558
3298	....	10 40 8.3	120 39 17	p F; S; p m E in meridian	444
3299	....	10 40 14.0	114 16 40	F; R; b M; 20″	563
		15.8	15 31	F; S; R. Precedes two bright stars	562
		17.3	16 22	p F; R; p s b M. Has 2 stars 10 and 11 m, following	689
3300	....	10 44 23.5	72 19 59	e F; v L; v g v l b M; 3′ or 4′ diam. Has a bright coarse double star (9 m) s p.	688
3301	....	10 44 32.8	134 15 31	The chief ✱ (9 m) of a cluster class VIII., 7′ diam; not rich or comp. Stars 10....13 m.	774
		44.6	14 8	A cluster VIII. class; not rich; irreg fig; 7′; st 9...13 m	686
3302	....	10 44 55.9	122 1 27	F; S; R; 15″. Has a ✱ 6.7 m s f	444
3303	....	10 44 58.1	109 56 43	v F; L; R; v g l b M; r; 90″	560
3304	....	10 45 24.9	110 52 41	F; S; R; b M; 15″	559
3305	....	10 47 3.1	115 14 25	F; R; g l b M; 20″	563
3306	....	10 48 29.6	103 23 47	e e F; S	700
3307	....	10 50 51.6	117 34 12	p F; S; R; b M; 15″. Among stars	452
3308	....	10 50 56.0	135 39 46	e F; S; R; g b M; 30″	553
3309	II. 100 h. 804	10 51 1.9	74 15 2	F; L; R; g b M; 2½′ diam. Has a ✱ 11 m 6ˢ south, and a little preceding.	688
3310	....	10 52 58.7	149 25 9	Place of a small double star in the following part of a loose, rich, pretty large cluster of stars 13 m, 8′ or 10′ diameter; a fine object; a very much condensed milky way group.	432
3311	....	10 54 19.1	148 56 10	Three very close stars, 10 m, in a nearly straight line, and a double star north of them, the whole involved in very faint nebula, so faint as to leave some doubt.	435
3312	....	10 54 20.9	104 34 47	p F; S; R; g l b M. Has a star 14 m near	700
3313	....	10 55 21.5	107 52 2	v F; p L; R; v g v l b M	560
3314	....	10 57 5.9	150 26 58	Chief star of a pretty rich cluster, class VII.	432

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3315	Δ. 323	10 58 10.5	147 49 26	A glorious cluster of immense magnitude, being at least 2 fields in extent every way. The stars are 8, 9, 10, and 11 mag, but chiefly 10 m, of which there must be at least 200. It is the most brilliant object of the kind I have ever seen.	543
		59 16.8	45 18	Chief * of a v L, R, loosely sc cl of st 8 . . . . 12 m, which fills 2 or 3 fields. A fine bright object.	434
		59 19.0	45 20	The chief star of a superb cluster, which has several elegant double stars, and many orange-coloured ones. [N.B.—*The observations are correctly reduced, but owing to the very great extent of the cluster, there is no reason to suppose any error in the observation of f* 543, *which* (*as no particular star is mentioned*) *belongs probably to the general middle of the whole.*]	435
		....	....	Viewed with Mr. Maclear, Feb. 26, 1835	551
3316	III. 824	10 58 48.7	108 33 22	F; S; R; p s l b M; 20″. The preceding of 2	560
3317	....	10 58 51.2	108 37 37	e F; S; R; v l b M; 15″. The following of 2	560
3318	....	10 59 20.7	126 15 18	e e F; attached to a v S star	574
3319	....	11 1 54.5	126 37 33	v B; R; p g m b M; 30″. The first of a group of 3	574
		55.3	36 35	p B; S; R; b M	573
3320	....	11 2 31.3	126 37 23	p B; S; R. The second of 3	574
		31.7	36 35	F; S; R; b M. On the same parallel with No. 3319. [N.B.—The chronometer reading, as set down in the sweeping book, would make the minute of R A 3, instead of 2; but the context of the immediately subsequent observation proves this reading to have been *impossible*, and unquestionably one minute too late.]	573
3321	....	11 2 36±	126 32 33	F; R; near 3 bright stars. R A concluded roughly, from an estimated Δ R A, with 574, No. 12.	574
		44.6	32 20	e F; p L; involving several stars. The last of 3	573
3322	....	11 3 14.6	125 55 47	e F; R; g l b M; 20″; precedes 3 st 11 and 12 m, nearly on the same parallel.	572
3323	....	11 3 16.5	149 19 8	Middle of a tolerably rich cluster, class VIII.	432
3324	....	11 4 36.8	150 27 12	F; oval. The first of a group of 6. Place by collation of diagrams. Pl. IV. fig. 10.	433
3325	....	11 4 38.4	150 18 30	F; oval. The 2nd of 6. Place by collation of diagrams	433
		42.4	18 7	R, s b M, by diagram. Place by collation, &c. Pl. IV. fig. 10	432
3326	....	11 4 45.4	150 23 25	Fanshaped, adhering to a star. The 3rd of 6. Place by direct observation.	433
		49.4	23 2	A * 12 m, with a fan nebula attached. Place by direct obs. Pl. IV. fig. 10.	432
3327	....	11 4 57.9	150 20 52	A * 11 m in centre of a round nebula. (The 4th of 6.) Place by direct observation.	432
		59.2	20 46	R; has a * in middle. Place by collation of diagrams. Pl. IV. fig. 10 ..	433
3328	II. 269	11 4 59.9	115 50 20	v B; p L; p m E; forms equilateral triangle with two stars 8 and 8.9 m following, distant 6′ or 7′.	563
		60.9	49 52	v B; p L; E; v s v m b M; has an elongated nucleus; 90″ long, 60″ broad. Pl. IV. fig. 10.	689
3329	....	11 5 3.2	150 17 10	F; L; oval; b M. Place, &c., by collation of diagram. The 5th of a group of 6. Pl. IV. fig. 10.	433
		7.2	16 44	L, b M, E in merid. Place, &c., by collation of diagram	432
3330	....	11 5 14.2	150 25 18	S, oval, E in pos 160 ± by diag. Place by collation of diagrams; the last of a group of 6. Pl. IV. fig. 10.	432
		15.4	26 10	e F; oval. Place by direct observation. [N. B.—This close and very remarkable group not admitting direct observation of all the individuals in two sweeps, their places have been made out by a very careful collation and independent measurement of two diagrams made in sweeps 432, 433, for that express purpose. In the first obs only 5 were noticed. In the other a 6th was seen and laid down. See fig. 10, Pl. IV.]	433
3331	III. 529	11 5 34.5	103 10 2	v F; R; 30″; v l b M. [N.B.—The MS. makes the degree of P D 102; but the nebula having been looked for and found by the working list as III. 529, 103 is doubtless the correct degree.]	700
3332	....	11 5 42.7	149 52 33	A close, p rich, comp, oval cluster somewhat insulated	543
3333	....	11 6 20.7	112 47 56	v F; R; b M; much diluted at the borders; 30″	559

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3334	....	11 7 50.3	150 19 52	A red star 10 m, the centre of an excessively condensed group of stars 15....18 m, with a nebulosity extending over 2′ diameter.	432
		....	....	Viewed the neb of ʃ 432, No. 21, which is a very remarkable object. The centre, when examined with powers 240 and 320, decidedly not a star, and the nebula about it all resolved. Perhaps it is a globular cluster v s v v m b M.	433
3335	....	11 8 3.3	122 54 7	e F; R; S; g b M; 15″	572
3336	....	11 9 31.3	115 12 7	F; S; R; g b M; 20″	689
3337	I. 241 Δ. 617	11 10 2.6	121 52 57	p B; v L; oval; v g v l b M; r; 5′ l, 3′ br	444
3338	....	11 10 21.6	165 17 29	F; p m E; g b M; 50″	782
3339	III. 530	11 15 6.6	102 53 40	F; S; R; g b M. The preceding of 2	687
3340	III. 531	11 15 37.3	102 54 22	p F; R; 20″; has 3 st 10 m near it, with the two following of which it makes an equilateral triangle.	700
		45.4:	54 55	p B; l E; p s b M; 20″; the following of 2. *The R A awkwardly taken.*	687
3341	....	11 16 51.7	115 48 37	F; v L; v g l b M. Several S stars near, and one = 7 m nearly south, at 6′ distance.	689
3342	Δ. 481	11 17 28.9	132 18 0	Cluster VIII. class; 60 or 70 st 11....13 m in a comp R space, 10′ diam	542
		32.9	17 56	Not very rich, but a good cluster; g comp M; L; R; very sc; almost fills field; st 10...14 m.	774
3343	II. 159 h. 891	11 17 38.8	72 11 40	p B; R; p g m b M	688
3344	III. 532	11 19 38.3	102 15 2	F; p m E in parallel; g p m b M; 20″	700
3345	....	11 20 12.3	149 1 10	B; p L; irr R; p g p m b M; 90″; r. Almost resolved. It is, however, by no means a mere knot of the milky way.	435
3346	....	11 21 25.1	125 27 36	p B; R; p s b M; 15″	448
		26.3	26 56	B; R; p s m b M; 60″	541
		27.4	28 9	p B; R; p s b M; 20″	446
3347	II. 562	11 22 57.8	103 17 52	p F; S; R; v g l b M; 15″	700
		58.9	17 37	p B; S; R; g b M; 15″	687
3348	....	11 23 7.2	119 15 32	p F; S; m E; attached like a wisp to a ✻ 13 m	445
		8.6	22 47	p B; S; m E; attached to a ✻. [N.B.—*The observations disagree much in P D, but it seems probable that a part at least of the discordance arises from the star having been taken in one observation and the nebula in the other. Still an error of 5′ in one or other reading must have been committed.*]	444
3349	III. 935	11 26 6.3	103 9 12	e e F; R; g b M; difficult, but a good obs	700
3350	....	11 27 8.4	127 1 0	p B; p L; R; g l b M; 40″	573
		9.5	0 18	F; l E; g b M	574
3351	....	11 27 30.5	127 2 55	p B; l E; g l b M; 40″	573
		31.9	2 43	v F; E; g v l b M	574
3352	Δ. 289	11 27 53.6	150 38 38	The preceding of two chief stars of a fine, large, loose, R cl of st 8....12 m; g p m b M; fills field; 150....200 stars.	432
		28 44.5	40 28	A very fine cl class VII.; nearly R; 8′ diam; l comp M stars 9....15 m; place that of an orange star 9.10 m following M.	434
3353	....	11 30 7.6	139 45 54	e F; R; 20″; in a field with 50 or 60 small stars	566
3354	....	11 30 38.1	126 47 53	p B; R; v s b M, almost to a star. It is n p a ✻ 9 m	574
		38.3	47 45	B; R; p s b M; precedes (to n) a ✻ 9 m	573
3355	h. 934	11 31 20.3	73 43 33	e F; R; adjoining to, or in the prolongation of, No. 41, ʃ 688. This observation sets at rest the doubt in my former catalogue, and shows the erroneous observation to have been that of ʃ 419.	688
3356	II. 103 h. 936	11 31 23.8	73 42 33	v F; l E; g b M; has another R neb at its extremity. See fig. 79 in my Northern Catalogue. See also the remark above (on h 934) as to the erroneous R A of ʃ 419 in that catalogue.	688
3357	....	11 33 38.2	102 54 37	F; l E; p s l b M; 40″. [N.B.—*It is just possible that by a double mistake of* 1^m *in* R A, *and* 1° *in* P D, *this nebula may be* h 957. *Both observations are correctly reduced.*]	700
3358	....	11 37 49.2	145 25 48	v F; l E; has two stars in it	437

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3359	III. 828	11 38 14.5	116 58 52	p B; l E; p s b M	689
		15.0	58 16	p B; S	562
3360	I. 120 h. 979	11 38 24.2	105 54 52	p B; L; R; v g p m b M; r (?); 90″	700
3361	II. 553 h. 981	11 39 21.5	100 0 21	p B; R; p L; 45″; 1st g; then p s b M	591
3362	....	11 40 30.0	126 34 20	p F; R; or l E; g v l b M; among stars	573
		33.1	34 23	p B; R; or v l E; v g l b M; 35″	574
3363	II. 864	11 40 38.6	118 22 27	p B; R; p s m b M; 15″	452
3364	....	11 41 5.3	137 19 23	Place of a D ✱ in a v L; not v comp cl; class VII., well defined and insulated; has about 50 or 60 st 9....12 m, with a few 13....14, all loosely sc; little or no compression in M; more than fills field.	776
		....	22 ±	A fine, large, but coarse cl class VII.; stars 9, 10, 11 m; two double stars are in it.	553
3365	....	11 41 54.8	146 14 8	PLANETARY NEBULA. Perfectly round; very planetary; colour fine blue; a very little ill defined at the edges; has no "satellite stars;" very like Uranus, only about half as large again and blue. Diam in R A = 1s.5.	784
		55.8	14 19	○; diameter 8....10″; perfectly round and well defined, and of a fine blue colour.	692
		56.1	14 9	○; a perfect planetary disc 6″ diam; quite sharp, with not the least haziness. It is of a most decided independent blue colour when in the field by itself, and with no lamp light and no bright ✱. About 10′ north of it is an orange coloured ✱ 8 m. When this is brought into view the blue colour of the ○ becomes intense. Shown to my attendant, John Stone, who, on being asked what colour, said at once "blue."	436
		56.9	14 3	○ = in light to a ✱ 7 m; diam in R A = 1s.3; viewed with all the powers; very beautiful; decidedly blue.	437
		59.0::	14 2	○; colour a beautiful rich blue, between prussian blue and verditter green. The light is fully = that of a ✱ 8 m diameter; 2s.0 in R A; 12″ by careful estimation. When kept steadily at rest its outline is sharp and clean, and perhaps a very little elliptic. A feeble lamp light gives it a deep indigo contrasted colour. Do. if a red star n p, about 10′ dist, be brought into the field with it. My attendant saw it and declared *proprio motu* that the light has quite a green cast in it. About 90 stars are in the field, none above 11 . 12 m, and only one of that magnitude (meaning when the neb is central). It has none but stars 16 m *near* it. (R A possibly not good being beyond the *f*).	543
		....	....	Feb. 26, 1835. Viewed with Mr. Maclear after *f* 551, the blue planetary nebula. Blue colour very conspicuous. Has one small companion certain [pos by diagram about 290°] dist = a full diameter, another nearly certain [at about half the distance by diagram, and pos about 135°]. The field is full of stars. Total light of ○ = a ✱ 6 or 6′ m. A very little oval in pos, about 160° or 165°.	551
3366	I. 259	11 42 26.6	117 54 42	p B; E; m b M; v r; 20″; has a v s ✱ s p involved	452
		27.3	51 27	B; p L; l E; g l b M; 80″ l; 50″ br; r; both polar distances are rightly reduced; one may have been 5′ misread.	449
3367	....	11 43 44.8	115 57 21	v F; v m E; 2′ l; 15″ br; pos of extension = 59°.3	562
3368	III. 290	11 45 25.3	109 37 29	F; p L; m E; g l b M; 60″; pos 236°.8	561
3369	Δ. 349	11 46 ±	144 46 21	Cluster VI class; p rich; irreg fig; R, with long appendages, g p m b M; 9′; stars 13 m.	784
3370	I. 67	11 46 0.2	103 1 28	v B; R; p s m b M; 40″; forms a triangle with 2 st 10.11 m	687
		1.2	1 32	B; S; R; v g b M; 20″	700
3371	II. 296	11 50 51.3	108 19 24	⊕; F; p L; R; 2′; resolved; stars barely seen; but in a better night for definition would no doubt be clearly resolved into st 16 m.	561
3372	III. 279	11 52 18.6	105 0 12	e e F; p L; R; has a ✱ 9 m 0.9 rad of field dist; 45° ± n f	700
3373	....	11 54 28.4	152 14 12	Cluster VII class; loose and scattered, but pretty rich	778
3374	....	11 55 33.5	156 21 31	v F; R; 40″; has a v S ✱ in centre; in a field of at least 80 or 90 stars	557
3375	III. 754	11 56 52.3	115 34 42	p B; R; g b M.	689
3376	....	11 57 12.0	103 35 27	e F; L; p m E; v g b M. The direction of elongation points between two stars 11 m; very near, and n f the centre.	700

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3377	Δ. 291	11 57 54.2	150 18 10	A * 10 m in centre of a pretty rich close cluster; 5′ diam; irreg R; stars 10....13 m.	435
		56.2	17 48	Middle of a rich, p L, irreg R cluster; poor VI. or rich VII. class stars 10....14; diam 5′, with stragglers.	432
		56.8	17 48	Cluster class VII; pretty rich and compact; stars 10....12 m, and nearly =; diameter 5′; the whole field is in a state of wavy fluctuation, owing to the S E wind, and so bad that each star is dilated into a large puff ball.	434
3378	II. 865	11 57 56.8	118 51 42	The first of a double nebula (pos 111°.2, by mean of 2 meas) B; R; p L; p s b M; r; 25″. Δ R A of this neb, and a * S of it, = 2ˢ.0.	452
		57.6	49 8	p F; R; g b M; 30″; r. The 1st of a double neb, pos = 120.3........	449
3379	II. 866	11 58 1.8	118 52 2	The 2nd of a double neb B; R; p L; p s b M; r; 25″................	452
		2.6	49 18	F; R; g b M; 20″; r; the 2nd of a double neb	449
3380	....	11 58 22.9	129 15 17	F; l E; g l b M; under a curve of 3 B stars	810
		24.0	15 18	F; S; R; at the end (or forming the continuation of an arc of 3 stars respectively, in order 8, 9, and 10 m.)	554
3381	III. 533	11 58 28.7	103 14 22	F; S; R; g b M; 15″	700
3382	....	12 0 9.0	98 5 11	F; v g l b M; p m E in parallel; 25″	697
3383	III. 534	12 3 58.5	103 4 37	v F; p L; R; v g b M; 60″	700
3384	....	12 4 39.8	151 46 11	Cluster class VI.; v F; almost nebulous	778
3385	....	12 7 30.7	132 22 33	p F; p L; l E; v g l b M; 50″ l..................................	458
		32.5	22 36	p F; p L; p m E; v g b M; 2′ l, 45″ br	455
		34.1	23 0	p B; L; p m E; v g b M; 2′ l, 1′ br.............................	456
		36.6	22 45	F; R; g l b M; 30″	788
3386	....	12 8 6.2	144 21 20	Cluster class VI. F; p L; irreg; 6′; resolved into st 13, 14, 15 m. Place of a * 12 m, chief and near middle of cl.	784
3387	....	12 13 17.8	122 31 54	v F; p L; R; v g v l b M; 90″; r................................	443
3388	....	12 14 46.4	147 10 30	A p rich cl; not m comp M; stars 12....14 m, in curved branches. A fine double star follows.	435
3389	Δ. 292	12 14 58.5	150 55 38	A large loose cl of small st 12....14 m; irreg R; not v rich; l comp M; diam 10′.	434
		15 16.3	57 56	Chief * 10 m, of a fine rich cl which fills field	432
		15 19.1	58 0	Cluster class VI. v L; v B. A star about 8.9 m taken; but the brightest part of the cluster is about 4′ n p. Fills field; not m comp M; stars 12..13 m. This cluster was found by Mr. Maclear in this ʃ made with him, not being aware at the time of its having been before seen in ʃ 432.	778
3390	Δ. 67 ? ?	12 16 7.4	161 43 20	⊕; v F; L; v g b M; 6′ diam; resolved into st 15 m; rich in stars; a delicate and faint object; has a * 45° n p, dist 5′ from centre. Almost perfectly insulated in a very large space almost entirely devoid of stars, being the smaller and southern lacuna below the great "coal sack."	567
		8.0	42 32	cl, class VI. Rich; F; L; R; v g l b M; 8′ to 10′ diam; stars discrete, 12, 13 ... 16 m; insulated; has a * 6 m just out of it, n p.	583
3391	....	12 16 21.0	128 48 13	p B; S; R; p g v m b M..	458
3392	Δ. 300	12 19 6.5	149 9 8	cl taken for Δ 300; a semi-elliptic group of stars 11..12 m, diameter 2′ ..	434
3393	....	12 19 31.8	132 19 8	e F; L; R; v g b M; 3′ diam....................................	686
3394	....	12 20 8.8	119 9 43	e e F; v S; attached to a * 13 m. (No doubt of the nebulous character of the object.)	564
3395	....	12 20 22.7	153 51 3	cl VIII. class; poor; scatt. The northern of 2 st 8 m taken............	581
3396	III. 764	12 20 26.7	112 13 25	p B; p m E; s p m b M; 60″ l....................................	588
		29.7	14 0	p B; E; s b M; pos of elongation 130°	690
3397	....	12 23 3.3	129 1 59	F; L; R; v g l b M; 90″	456
		23 5.4	2 43	e F; p L; R; v g l b M; 40″	458
3398	II. 771	12 23 31.4	96 36 43	v F; L; l E; g v l b M; 2′ l by 100″ br	697
3399	....	12 26 33.6	128 58 13	p F; S; R; p s m b M to a * 16 m	458
		34.3	58 4	p B; S; R; p s m b M to a * 16 m	456
3400	....	12 27 0.6	128 29 53	F; R; or l E; g l b M	574
3401	....	12 28 29.4	132 41 18	v F; S; almost exactly south of a * 10 m, 30″ dist	686
3402	....	12 28 41.6	124 34 7	v F; L; l E; v g l b M; 60″ l, 40″ br	572
3403	....	12 28 42.7	129 36 3	F; p m E; 25″ l, 15″ br; follows 2 stars	458

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3404	M. 68	12 30 30.1	115 48 50	⊕; irr R; g b M; diam in R A = 12 . . . 15 sec. All clearly resolved into stars 12 m; very loose and ragged at the borders.	689
3405	....	12 31 46.2	129 59 3	e F; L; R; p s l b M. The first of 2	458
3406	....	12 31 53.7	130 2 8	F; L; R; v g b M; r (?). The following of 2	458
3407	Δ. 272	12 32 29.3	152 2 14	cl class VII. Stars 11 . . . 13 m; about 6′ long and 4′ br; has 10 stars 11 m, and some 20 or 30 smaller. It occurs in the midst of the black space following α Crucis, which is by no means void of stars.	778
3408	....	12 33 7.2	129 44 16	e F; v S; R; s p a star at the edge. The first of 2	456
3409	....	12 33 26.4	129 48 36	p F; S; R; p s l b M; 15″. The following of 2	456
3410	II. 772 h. 1393	12 33 37.5	96 6 16	v F; l E; g l b M	697
3411	II. 773 h. 1394	12 33 38.4	96 1 31	v F; R or l E; g l b M	697
3412	....	12 34 43.7	130 48 53	p B; S; p s b M; 12″	458
3413	....	12 35 3.5	129 47 42	v F; R; b M; r. Wind violent. [Right reduced. The degree of P D *certainly correct.*]	460
3414	II. 558	12 35 49.8	99 9 0	e F; attached like a wisp to a * 16 m; a * 9 m precedes	591
3415	....	12 36 ±	130 10 ±	F; R; p L; g b M	456
3416	....	12 36 57.8	130 47 3	e F; S; R; v g b M. [*Right reduced. See No.* 3413.]	458
3417	....	12 37 14.2	97 42 52	v F; R; g l b M; 30″	697
3418	....	12 37 39.8	130 40 3	e F; l E; v g b M	458
3419	....	12 37 58.1	128 38 13	e e F; p L; R; 60″. (No doubt.)	574
3420	....	12 38 2.9	100 42 42	e F; S; has one or two small st entangled in it	591
3421	....	12 38 6.8	132 24 58	p F; S; R; g b M; 15″	686
3422	....	12 38 24.5	130 37 33	e F; S; R; v g b M; 60″; n f a small star	458
3423	....	12 38 24.9	99 7 38	p F; E; g v l b M; 45″ l	698
3424	Δ. 510 ?	12 39 33.7	130 22 38	p B; L; R; g b M; 2′ resolvable	456
3425	I. 129 h. 1437	12 40 12.5	97 43 58	v B; R; v s v m b M; 2½′; r to left eye	697
3426	III. 524 h. 1438	12 40 16.5	100 28 43	p B; m E; v l b M; 30″ l, 15″ br	698
3427	....	12 40 36.9	130 21 58	v F; v S; R; p s b M; 10″	456
3428	Δ. 511	12 40 47.9	130 26 23	p B; R; g b M; 30″. (More nebulæ hereabouts.)	456
3429	....	12 42 52.3	130 28 3	F; R; g b M	458
3430	....	12 42 ±	130 10 ±	The first of 3	458
3431	....	12 42 ±	130 10 ±	The second of 3	458
3432	I. 133	12 42 57.0	99 31 44	A star 9 m, with a strong burr about of very small extent; diam 10″. It is the best specimen of the class of "stellar nebulæ" that I remember to have seen. A star s f, 10 m, dist 1½′; has no burr.	591
3433	....	12 42 58.3	130 8 53	F; L; E; g b M; has two more nebulæ preceding, a little to south	458
3434	....	12 43 27.3	131 44 38	B; R; first v g, then v s b M; 50″	686
3435	Δ. 301	12 43 36.7	149 25 28	κ Crucis. Place of the largest, central, red star	434
		37.1	25 30	The same red star taken. Several others laid down, of different shades of green.	435
		....	25 36	The central star (extremely red) of a most vivid and beautiful cluster of from 50 to 100 stars. Among the larger there are one or two evidently greenish; south of the red star is one 13 m, also red; and near it is one 12 m, bluish. (For a more particular description of this beautiful cluster of variously coloured stars, see the monograph figure, Pl. I. fig. 2, and the accompanying description.) The R A given by this observation is 43 12.6, an error induced by the slider of the eye-piece not having been pushed home to its final bearing.	432
		....	....	Viewed, and roughly figured for future reference	433
3436	....	12 44 31.2	128 48 27	B; S; l E; p s m b M; 25″. Wind violent	460
		33.6	48 3	p B; p L; l E; g m b M; 40″	574
		....	....	Viewed in its place by working list; p F; S; R; not 1st class	573
3437	II. 559	12 45 13.1	98 16 50±	v F; S; R; v l b M; the preceding of a double nebula	697

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3438	....	12 45 14.1	98 16 29	v F; S; R; v l b M; 15″; has a ✱ s f; the following of 2. [N.B.—II. 559 *is not noticed as double in Sir W. Herschel's description.*]	697
3439	....	12 45 35.7	137 49 6	v F; S; R; g l b M	553
3440	....	12 47 2.3	118 35 13	F; R; g v l b M; 40″	564
3441	....	12 47 26.2	130 52 33	e F; R; g b M; 40″. The preceding of 2	458
3442	....	12 47 26.3	130 54 3	e F; R; g b M; 30″; 90″ dist from the foregoing pos = 170°.9	458
3443	....	12 47 31.6	154 1 36	Cluster; R; p S; resolved; irreg; g b M; 3′; stars 13 ... 18 m......	581
		33.0	2 1	Class VI.; p rich, irreg fig; g b M; 3′; stars v S; comparatively insulated; has 2 bright stars 8.9 and 9.10 m.	568
		36.2	2 25	Cluster, VII. class; 5′ diam; stars 10 ... 15 m. The foll of 2 B st taken	431
3444	Δ. 164	12 47 56.7	159 56 50	⊕; B; L; R; g b M; stars 14 m, and one 7 m n p the centre; a fine object.	567
		48 25.1	57 25	⊕; p B; L; p rich; at first g, then v s p m b M; diam of the bright part 3′, of the loose stars 10′; stars 12.... 16 m, and one large one 7 m, 3′ or 4′ north of the centre. [N.B.—*There seems to have been some indecision in the first obs whether to take the large star or the central portion of the nebula. I presume the R A to be that of the star; if it be not that in one or other obs, the moveable wire has been taken for the fixed.*]	584
3445	II. 549 h. 1484	12 47 58.8	97 35 50	B; L; m E in merid; g p m b M; 3′ l	697
3446	....	12 48 26.8	128 49 50	p F; v S; R; s b M to a ✱ 17 m; pos from ✱ 10 m (distant 60″) = 250°.3.	456
3447	....	12 48 29.0	116 22 27	F; R; g b M; 25″........	689
3448	....	12 48 32.6	135 19 21	F; m E; v g b M; 90″ l, 25″ br........	695
		34.8	20 23	B; L; m E; g l b M; 2½′ or 3′ l, 1′ br; pos = 157° ±........	455
		....	21 —	F; m E in pos 147°; v l b M; 2′ l. Taken beyond the meridian, and out of reach in R A.	776
3449	Δ. 311	12 49 49.8	148 40 58	A very poor cluster of about 70 stars 11....15 m, very loosely scattered over a space about 15′ long and 8′ br.	434
		68.0	40 38	Cluster VII. p rich; L; irr R; 10′ diam; 80 or 100 st, 10, 11, 12 m, with a stippling of much smaller ones.	790
3450	....	12 52 6.6	120 2 18	v F; R; 30″; attached to a star; the preceding of 2........	564
3451	....	12 52 13.6	120 0 18	v F; v S; R; s l b M. The following of 2	564
3452	....	12 52 28.2	131 51 11	e F; precedes 3 or 4 st, 11..12 m	456
3453	II. 190	12 54 9.5	97 9 48	v F; R; g l b M; 30″	697
3454	....	12 54 34.1	130 30 3	v F; R; precedes 2 st 8.9 and 9 m (with which it makes nearly an equilateral triangle by diagram).	458
3455	....	12 54 59.8	136 18 20	e e F; S; R; the preceding of 2; a ✱ 7 m, just at the northern edge of the field.	776
3456	....	12 54 59.8	119 36 40	p B; R; S; b M; 15″; has a ✱ 6 seconds following	450
		61.3	36 48	p F; R	564
3457	....	12 55 15.4	136 19 40	F; S; R; 15″. The following of 2	776
3458	II. 561	12 55 22.6	99 25 58	p F; L; R; g p m b M; 60″	698
3459	Δ. 411	12 55 30.4	138 22 24	B; v L; v m E; v g l b M. Length much more than a diameter of the field, or than 15′. Its light extends to a ✱ 14 m beyond the parallel of B 4299. Position of elongation = 38°.7.	566
3460	....	12 55 50.0	132 41 3	B; R; g p m b M; 60″. The preceding of 2........	686
		51.1	41 15	p B; S; R; b M; 20″	455
3461	....	12 55 54.9	124 25 24	p L; F; R; v g l b M; 50″	446
3462	....	12 55 58.1	132 36 25	e F; S; R. The following of 2; barely perceptible, but a sure observation.	455
		59.1	35 43	e F; R; p s l b M; 80″	686
3463	....	12 56 38.5	126 38 40	v F; p S; among stars; wind furious	460
		....	39 ..	Viewed; a diagram made representing it as round, with three small stars, one distant about 1 semi-diameter from border; pos about 293°; another dist ⅔ diameter; pos = 75°; the 3rd dist 1½ diam; pos = 300°.	573
3464	....	12 56 48.2	118 50 33	F; R; g b M; 35″	564
3465	I. 130	12 56 58.1	97 6 8	v B; p L; p m E; p s m b M; 90″ l	697

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3466	....	12 57 55.9	117 18 41	v F; v L; oval; v g l b M; 3′ l; 2′ br	449
		55.9	19 14	e F; v L; oval; v l b M; 3′	450
3467	....	12 58 0.7	112 46 5	F; p L; R; g l b M; 60″	690
3468	....	12 58 56.0	138 35 44	B; R; g m b M; 80″	566
3469	....	12 59 51.9	117 44 18	e F; R; 30″	564
3470	....	13 0 12.6	132 11 36	v F; S; E; *possibly* a small group of stars, but I think it is nebulous....	455
3471	....	13 0 39.3	111 38 30	p F; R; s l b M; 35″. Among stars	690
3472	I. 42 h. 1540	13 0 49.1	96 54 49	p B; R; v g p m b M; 60″	697
3473	....	13 3 8.0	132 12 6	p B; p S; R; g b M; 15″; in a curve of 3 or 4 stars	455
		8.2	11 8	p F; S; R. The middle object in an arc of stars	458
		11.1	11 10	B; S; R; p g b M; 12″. In the middle of an arc of 4 st	456
3474	....	13 4 28.7	132 3 23	p B; R; b M: 40″	458
		31.8	3 25	p B; p L; R; g b M; 50″	456
		32.5	3 15	p B; p L; R; g b M; 50″; has a ✱ 7 m; 3° n f; dist = $7\frac{1}{4}'$	788
3475	....	13 6 4.0	152 30 51	A great cluster, or a surprisingly rich portion of the milky way. It contains 34 stars 11 m, and perhaps 150 or 200 more of less magnitudes in the field.	596
3476	....	13 6 4.1	149 9 35	Cluster VIII.; oblong; 10′ by 7′, of loose sc st 11 m	790
3477	....	13 6 18.5	113 4 55	F; L; R; v g v l b M; a star 9 m; 1′ north; precedes 10^s	690
3478	....	13 6 47.6	117 31 18	p F; R; has another neb n f; Δ R A = 20^s ±; Δ P D = 5′ ±	564
3479	....	13 7 8±	117 26 ±	The following of 2	564
3480	I. 138	13 8 47.7	115 57 30	B; p S; R; p s b M; 12″. A star 9 m follows $10^s.5$	453
		50.7	56 59	v B; R; b M; has ✱ 10 m 11^s following; 30″ south	689
3481	....	13 8 53.2	124 25 43	e F; v S; R; near one or two stars	446
3482	....	13 8 53±	124 31 58	e F; v S; E. (? if really a nebula)	446
3483	....	13 9 0.7	137 0 50	p B; S; R; p s l b M; 25″	776
3484	II. 566	13 10 31.0	116 30 47	p B; S; p m E; p s b M; has a ✱ 7.8 m following	453
3485	....	13 10 47.7	132 48 7	v F; S; R	455
		47.8	48 55	v F; R; 20″. The 1st of a group of 4	788
3486	....	13 11 11.3	132 49 55	e F; R; 15″. The 2nd of a group of 4	788
3487	....	13 11 19.0	132 49 12	B; p L; R; 60″	455
		21.3	49 5	p F; R; 30″. The 3rd of 4	788
3488	....	13 11 21.5	132 50 7	F; l E. The last of group; attached to the preceding one	455
		27.3	50 35	v F; R; 20″. The last of 4	788
3489	III. 117 h. 1576	13 11 31.9	101 51 21	v F; S; R. The 1st of a group of 3 nebulæ	698
3490	II. 193 h. 1577	13 11 33.9	101 46 18	p B; S; p m E. The 2nd of a group of 3	698
3491	III. 118 h. 1578	13 11 38.9	101 48 18	F; S; R. The 3rd of a group of 3	698
3492	....	13 12 22.9	125 44 40	v B; R; s v m b M; 50″	573
3493	II. 567	13 12 24.6	116 32 7	v B; p m E; g m b M	689
		25.3	32 7	B; R; p L; p s m b M to a star	453
3494	....	13 13 32±	121 27 7	e e F. The preceding of 2	701
3495	....	13 14 32.3	121 27 7	F; l E; p s b M. The following of 2	701
3496	....	13 14 39.5	152 31 23	Cl class VI.; oval; 4′ l; 3′ br; stars 12....16 m; an extremely rich clustering patch in the milky way, which is here superb.	596
3497	III. 115	13 15 0.8	101 24 3	p B; S; R; or l E; definition bad; doubted at first if it really was a nebula, but remained satisfied.	698
3498	....	13 15 3.3	126 47 32	B; R; p s v m b M; 30″; r; probably a dimly seen ⊕	460
		4.8	48 10	p B; R; p s b M; 20″	573
3499	....	13 15 21.6	119 25 37	e F; S; l E	449
		22.5	25 20	v F; S; E	450
3500	....	13 15 25.0	119 27 30	v F; v S	450

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3501	Δ. 482	13 15 28.7	132 8 3	[A nebula consisting of two lateral portions, and] no doubt of a small streak of nebula along the middle of the slit or interval between them, having a star at its extremity. See fig. 2, Pl. IV. Position of the slit, 124.7; of the star, with another ✱ near the nebula and south of it, 332.3; other stars also laid down (see description of the figure). A most superb calm night; objects admirably defined. Shown to a bystander (J. R.) who saw it as figured and described.	458
		29.5	8 8	[Two nebulæ, or two portions of one separated by a division or cut.] The cut is broad and sharp. The two nebulæ are very nearly alike. Perhaps the slit is larger towards the n p end, where there is a star between them. There is certainly a very feeble trace of nebula, an island as it were, running from this star between the sides of the slit. N.B. No "moon-light effect" seen between the edges. Night very fine. Pos of the slit, 120°.3. The place taken is that of the star within the slit.	455
		31.7	7 30	A figure taken (which represents the internal faint nebula), but no description.	457
		33.1	7 17	A most wonderful object; a nebula v B; v L; l E; v g m b M, of an elliptic figure, cut away in the middle by a perfectly definite straight cut 40″ broad; pos = 120°.3; dimensions of the nebula, 5′ by 4′. The internal edges have a gleaming light like the moonlight touching the outline in a transparency.	454
3502	....	13 16 16.5	118 56 48	p B; S; E	451
3503	Δ. 312?	13 16 20.2	148 6 59	General middle of cluster VIII. class. p B; L; irr; sc; 30 or 40 stars 11.12 m, and many smaller; pretty well insulated, though on a ground rich in v small stars.	582
		30.1	7 39	Cluster VII. class; rather a fine cluster; rich, but loose and straggling. Fills field. Stars 11 and 12 m.	790
3504	Δ. 440	13 16 36.0	136 35 10	⊕; *ω Centauri;* v v B; v v L; v v g m b M; all clearly resolved into stars of two magnitudes, viz., 13 and 15; the larger lying in lines and ridges over the smaller. Near the centre are two distinct darkish spaces formed by a deficiency of the larger stars 13 m within, and an excess without. This most glorious object fills the whole field *with its most condensed part,* and its stragglers extend ¾ of a field beyond it either way. It is very conspicuous to the naked eye as a dim cometic looking star, 4 m or 5 m.	776
		38.9	35 38	⊕; *ω Centauri;* diameter full 20′. It much more than fills the field. When the centre is on the edge of the field, the outer stars extend fully half a radius beyond the middle of it. The stars are singularly equal, and distributed with the most exact equality, the condensation being that of a sphere equally filled.—Looking attentively, I retract what is said about the equal scattering and equal sizes of the stars. There are two sizes 12 m and 13 m, without greater or less, and the larger stars form rings like lace-work on it. One of these rings, $1\frac{1}{2}'$ in diam, is so marked as to give the appearance of a comparative darkness like a hole in the centre. There must be thousands of stars. To the naked eye it appears as a ✱ 5 m or 5.4, rather hazy. There is a ✱ 9 m on the sp border of it, about 4′ or 5′ south of centre, and several 8 m are scattered far away. My attendant (J. S.) called up, who saw the hole and darkness, and described it as I have done above. On further attention the hole is double, or an oval space crossed by a bridge of stars. Position of axis = 150°. Altogether this object is truly astonishing. (See Pl. V. fig. 7.)	695
3505	....	13 16 44.9	122 59 7	p F; R; g l b M; 25″	572
		47.4	60 6	e F; S; R; g b M; 12″	446
3506	....	13 18 9.3	152 32 3	A portion of the milky way broken up into clustering masses of astonishing richness. There must here be at least 200 or 300 stars in the field, none greater than 10 m.	596
3507	....	13 18 11.2	118 40 28	p F; S; R; b M; has a ✱ 2′ fol; pos by diag = 67°	451
		12.6	41 39	F; S; R; p s l b M; 15″	449
3508	....	13 18 23±	118 45 ±	The preceding of a double nebulæ; the individuals are =; R; v F; S; p s l b M	449
3509	....	13 18 24.2	118 44 28	p F; S; the following of two equal neb	449
3510	....	13 18 28.5	138 1 25	p F; irr R; or triangular; g b M; r; 40″	693
		31.2	1 19	p B; l E; g l b M; has a ✱ 8 m 5′ dist; pos sp	566
3511	....	13 19 38.0	122 17 2	p F; L; p m E; v g b M; r; 4′ l; 2′ br; with left eye feebly stippled	701

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3512	....	13 20 6.0	150 3 21	Place of a double star in centre of a rich, much comp but v F cluster; g b M; 4′ diam; st 15 m; a remarkable object. [N.B. By a singular coincidence of errors the R A of this obs has been mistaken 1^m, and the P D 1°. Both are corrected. The P D 149° *could* not have been observed in ∫ 596.	790
		6.8	1 59	A small but very rich milky way cluster; $3\frac{1}{2}'$ l, 3′ br; st 13....16 m. Place that of a double star.	596
3513	....	13 21 11.2	117 16 38	v F; p L; R; 50″; has a ✻ 7 m n f; dist = 10′..................	564
		12.8	15 21	v F; p L; l E; a v L ✻ follows 12′ ± dist........................	453
3514	Δ. 252 ?	13 21 37.1	155 5 51	A very strange object. See fig. 1, Pl. VI. A nebula of oval fig, but having a central and brighter axis somewhat curved, and terminating in two masses brighter than the rest; diam about 90″ or 100″. It involves 3 stars, one of which with 320 is double. The principal ✻ is 10 m, the others e S; a multitude of other stars in field.	568
3515	....	13 21 48.0	123 54 46	F; p L; R; g l b M; 45″..................................	446
		50.6	54 2	F; p L; l E; v g l b M; 50″	572
3516	....	13 22 15.6	122 21 7	p B; S; R; first g, then p s b M; 45″	701
3517	III. 507	13 23 17.9	97 53 56	v F; S; R; g b M; 15″	697
3518	....	13 23 30.4	137 15 22	F; p L; R; v g b M; 50″; on a ground faintly stippled with minute stars	464
3519	....	13 25 28.3	122 36 22	e F and S; has 2 st less than 1 diam of neb, distant one (by diagram) s and one p.	701
3520	....	13 26 —	135 2 ±	v F; S; R; has a ✻ near lower edge	455
3521	....	13 26 17.8	122 34 57	v F; S; R; precedes a ✻ 10 m, dist $1\frac{1}{2}$ diam by diag	701
3522	....	13 27 2.3	138 57 44	e e F; l E; 30″. Requires a newly polished mirror, and a night such as this is to be seen.	566
3523	Δ. 628	13 27 26.1	119 0 18	185 Bode *Centauri*. E; pos of axis = 55°.1, which is also that of one of the 2 stars involved in it = 10 m. (See fig. 5, Pl. IV.)	451
		27.9	0 16	v B; v L; s b M to a centre = a star 9 m, diam 8″, of a resolvable character like a ⊕, surrounded by an immensely L, extremely dilute almost equable light 7′ or 8′ diam, somewhat oval, and passing with excessive suddenness into the central light.	449
		28.5	0 20	F; v L; E; v s v m b M to a sharp nucleus (ill seen, owing to clouds) ..	450
		30.1	0 8	v L; v B; m E, v s v m b M to a nucleus; diam in R A = 17.5 sec = 3″, 49″ in arc; a small ✻ involved; pos with nucl 80° ± by a rough diagram made at the time.	564
3524	....	13 27 33.1	131 59 3	v F; p L; l E; g l b M; 90″ l..................................	458
		33.7	59 20	F; p L; R; g l b M; 40″......................................	457
		35.3	58 30	F; p L; oval; v g b M; 60″ l; 50″ br	455
		36.4	58 14	F; p L; R; v g l b M; 40″	456
3525	....	13 28 27.6	134 58 15	e F; S; attached to a ✻ 13 m. (Certain)	464
		31.3	61 17	v F; S; R; v g l b M; has a ✻ at its edge........................	454
3526	II. 638 Δ. 623	13 30 18.2	120 46 22	v B; m E; p s m b M; $2\frac{1}{2}'$ l; 1′ br..................................	701
3527	....	13 30 37.2	100 37 43	p B; L; p m E; g l b M; 2′ l; $1\frac{3}{4}$ br..............................	698
3528	....	13 32 2.3	119 3 18	v F; R; v l b M; 80″	564
3529	....	13 32 37.5	137 19 3	B; R; v g l b M; 45″; has 3 st 14 m near	463
		38.0	18 2	B; p L; l E; g l b M; r; 3 v small st near	464
3530	....	13 32 53.1	152 2 50	Cl class VII.; poor; L; loose irreg fig; fills field; st 12 m............	578
		67.4	2 26	A fine rich milky way group, or rather outlying cl of a much finer cl following it.	596
3531	Δ. 273	13 34 47.5	152 3 0	Cl class VII. Small, compact irr R; 1 ✻ 8 m, and 15 or 20 smaller in a knot. No. 1, ∫ 578, is an outlier of it.	578
		54.2	2 16	A brilliant, compact, milky way cl. Rich; irreg fig; g b M; 10′; stars 10, 11, 12 m.	596
3532	....	13 35 15.7	148 20 17	Cl class VIII. L; v rich; loosely sc; st 7.8....16 m; it is an outlier of the milky way, but very rich and much insulated.	790

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3533	Δ. 388	13 35 44.3	140 31 1	⊕; B; R; v g b M; resolved; diam 2′; st 16 m; a B st 7 m in field ..	693
		45.4	....	⊕; v B: g m b M; 2½′ or 3′ diam; resolved into st 15 m; has one * 12 m, s f; the centre near the edge. It is in the field with B. 4618 a star 6 m.	566
3534	....	13 36 39.6	153 50 16	A F, oblong, elliptic cl of st 14 m; g l b M; 4′ l; 2½′ br	568
		42.6	50 6	A S, irreg R, very compact knot of M way; g v l b M; stars 14 m; a * 8 m precedes.	581
3535	....	13 37 43.9	119 32 8	v F; R; v l b M; follows a B double star..........................	451
3536	....	13 37 59.0	120 4 8	p F; R; g b M; 20″; has 2 or 3 stars close to it......................	564
3537	....	13 38 49.8	149 35 39	Cl VII. class; much more than fills field; a very L and rich milky way cl, quite insulated on the prec, n, and foll sides, and nearly so to the S; forming a kind of peninsular projection, but much richer than the main body of the milky way.	790
3538	....	13 38 57.5	119 35 18	F; R; g b M; 30″	564
3539	....	13 39 40.5	119 38 18	F; R; g b M; 30″	564
3540	II. 306 h. 1671	13 40 17.8	96 22 26	F; R; p s b M; 20″	697
3541	....	13 40 18.3	140 21 33	PLANETARY NEBULA. A very singular object. At first I thought it an ill seen double star; 12 . 13 = 12 . 13 m; dist 2″; but not being able to get it into focus I applied 320; which showed it as a hazy, rather elongated, planetary nebulous disc, as if a double * all but obliterated. It is positively not a star. The field is full of stars, two of which (Nos. 6 and 7 in the figure), are equal to this object in light, but 320 shows them both quite sharp. It is a difficult object to find, and unless in a good night for definition (this is superb) it could not be recovered. The place is well taken. The stars in the neighbourhood [laid down in a diagram made at the time] are— 1 the neb; 2 = 3 = 4 nearly equal, and 14 m; 5 = 15 m; 6 = 7 12 m. It is the smallest and most difficult planetary nebula I have ever seen. Fig. 15, Pl. VI, exhibits its appearance with power 320. [N.B.—*By this figure it would seem rather to belong to the class of double nebulæ or double stellar nebulæ of the utmost remoteness, than to that of planetary nebulæ, properly so called.*]	693
3542	Δ. 282	13 42 3.2	151 0 40	Cl VII. class; 14 stars 11 m, and 30 or 40 smaller in a round space 8′ diameter. The general middle taken.	578
3543	III. 923	13 43 14.5	117 38 23	B; l E; s b M; 20″..	564
		15.1	37 28	p B; R; l b M; 20″	451
3544	....	13 43 47.6	137 39 36	v F; v S; R; 6″; has a * 8 m; 3′ f in parallel	464
3545	....	13 45 50.2	159 33 5	Cl VIII. class; v L, loose; straggling; stars L and S; fills field. The star taken is a double one.	584
		86.3	35 45	Cl VIII. class; irreg fig; 8′ diam; consists of about a dozen stars 11 m, and a great many 12, 13, 14 m.	598
3546	....	13 46 15.4	119 29 58	p F; R; g l b M; 20″; exactly in M between 2 st 10 m................	564
3547	....	13 47 25.3	133 5 58	p B; v S; R; g b M; 15″..	686
		26.3	5 35	p F; S; R; p g m b M; in a group of small st	788
3548	....	13 47 29.9:	129 8 53:	Place hurried and imperfect. Shown to Mr. Maclear and friend. A D * h 4636 involved in neb.	461
		32.6	8 20	Double star involved in neb. See fig. 10, Pl. VI. For meas of the D star, see Catal of those objects. Adjacent stars laid down, b and c = 13 m; pos of 1 = 28°.3; a = 9 m; the nebulosity is very evident. No. 3 has no such nebula; neb at least 2′ or 2½′ diam.	573
		33.7	8 49	A close double star in a v L, B, luminous atmosphere, 2′ diam. The * a, which is quite as bright, has no such atmosphere. The atm is v l b M. The star was not noticed as double till too late for a good meas after I had showed the object to my attendant J. S., verified with 240 and 320. A furious hot north wind, but the definition of stars excellent. It is no illusion, other stars are sharp and brilliant, and have not the least nebulous appearance.	460
		34.1	9 23	Neb seen as above. Careful obs taken of the stars in and adjoining it, which see in the Cat of D stars.	574
		....	....	v F; 2′ diam; a * 9 m following, is about 4′ dist, is unaffected with neb. Measures taken. See Cat of D st.	718
		....	....	Viewed past meridian, seen as above, and a diagram made and measures taken of the double star, which see.	462

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3549	....	13 48 39.0	148 46 52	Cl VI.; F; rich; highly comp; consists of p L and e S st; fig oblong; 10′ l; 7′ br; place that of chief ✻ 9 m.	790
		69.5	44 27	Cl VIII. class; 8′ l; 5′ br; stars 12 and 13 m. [N.B.—It is evident that in this obs, probably from defective weather, the e S stars of this cl were not seen.]	582
3550	....	13 50 50.6	118 2 28	v F; R; g l b M; 25″..	564
3551	....	13 51 10.9	123 7 34	v F; S; R; g b M; 15″..	792
3552	....	13 51 26.5	122 14 32	p B; p L; R; v g b M; 90″..	701
3553	....	13 53 1.7	130 35 20	e F; E between 2 v S st a little s f..	457
3554	....	13 53 37.6	123 9 26	p B; p L; R; g p m b M; 50″	792
		39.6	8 43	p B; p L; R; g b M; 50″	446
		40.8	8 47	p B; R; g m b M; 25″..	572
3555	Δ. 431	13 56 5.9	137 31 13	A region of L. B st 8, 9....&c. m; a very coarse cluster. Place that of a brilliant group, one of which is a double star class III.	463
		39.6	30 9	A region of L stars very loosely distributed, but which yet decidedly form a cluster. Place that of a pretty close double star (4″) in the middle of a group of 8. The cluster is 30′ diameter, and is divided into distinct groups. [N.B.—The two double stars taken in this and the foregoing observation are not the same.]	695
		41.7	29 11	Place of a double star [the same as that of ∫ 695] in a semi-elliptic group forming part of it, but insulated in a large scattered cluster or tract of bright stars.	464
3556	....	13 57 17.5	119 11 48	p F; S; R; p s l b M; 15″..	564
3557	....	13 59 55.2	132 30 43	p F; v L; R; v g b M; 4′	686
3558	....	14 1 ±	122 50 ±	F; R; near and to the north of a ✻ 8 m	792
3559	....	14 1 15.3	135 16 43	F; S; R; p s b M; 10″..	463
		18.0	17 14	e F; R; g l b M; 20″	464
3560	....	14 2 31.9	119 51 13	p B; L; R; g b M; r. Stars barely seen in the nebula, besides several others about it.	564
3561	....	14 2 40.9	116 18 18	v F; S; R; b M; n p a star..	453
3562	....	14 4 59.3	137 18 36	F; S; R; near 2 st 12 m; a small D ✻ foll; 5′	464
		59.5	19 20	p B; S; R; p s b M; 15″	463
3563	....	14 7 49.5	132 35 5	A star 12 m, perfectly sharp in the centre of a very dilute, very gradually fading atmosphere, p m E; 90″ l, 40″ br. A very remarkable specimen of its class.	788
3564	....	14 10 40.2	118 27 58	e F; L; 2′ diam; has some small stars involved	451
3565	III. 924	14 14 3.7	117 53 38	p F; E; g v l b M; 25″..	564
3566	....	14 14 9.8	144 1 35	A poor, coarse, oblong cluster, which is the most condensed part of a rich region of stars 10 m. Place of a double ✻ in the following part.	468
3567	....	14 14 50.6	167 37 48	v F; E; g b M; with a feeble appearance of stars, but I have hardly a doubt of its being a nebula.	587
3568	Δ. 313	14 15 26.1	148 51 44	A small close group of large and small stars, forming a cluster	713
3569	III. 120 h. 1798	14 15 56.1	102 24 12	F; p L; R; g v l b M; 90″	702
3570	Δ. 302	14 17 9.0	149 57 12	Cl VII. class; irr fig; not m comp M; L; 10′ diam. There are perhaps 100 stars, 11 and 11.12 m; with a good sprinkling of 12 and 13.	582
		11.5	57 25	Cl VI. v rich; irreg R; p m comp M, but sc at borders; 15′; there are 3 st 10 m, 5 or 6 11 m; the rest below 11 m.	578
		11.6	56 39	L, p rich, irreg cl of sc st 8....14 m; fills field	715
3571	....	14 19 49.8	118 59 23	e F; R; 20″..	564
3572	Δ. 469	14 21 45.2	133 26 22	p F; L; R; v g l b M; has many stars intermixed	455
		45.8	26 27	p B; L; v g b M; 2′; r, or with stars	454
3573	Δ. 342	14 22 59.4	145 48 34	Place of a red star, the chief and centre of a fine bright, but not rich cl, of about 30 stars 9....13 m. This red or high yellow star is 8 m.	694
		60.9	49 3	Large, p brilliant, coarse, sc cl VII. class, which more than fills field; 50 stars more or less 9....12 m; chief ✻ 7 m, yellow, somewhat insulated, taken for place of cluster.	577

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3574	....	14 24 30.4	135 12 38	v F; S; l E; between 2 stars 13 and 14 m, forming northern side of a trapezium of 4 stars; one of the others is 8 m.	463
		33.3	12 20	v F; E; between 2 stars (by diagram), and has a large star s p..........	695
3575	....	14 28 32.0	134 17 52	not v F; S; v g b M; 25″; among stars...........................	454
3576	II. 196	14 30 19.9	115 47 45	v B; p L; R; p s b M; 1st class; 20″; r; several stars near. [N.B.—In the R A the wire is not set down. The 1st presumed.]	453
3577	Δ. 333	14 31 4.5	146 49 0	Cluster VII. p rich; st 11....13 m, irreg sc 10′ diam; rather more comp M.	469
3578	III. 508 VI. 8?	14 33 2.6	98 16 31	F; p L; p m E; g b M; with an appearance of resolvability, arising as I imagine from a few small stars accidentally on it, as I hardly think it can be reckoned a cluster in the sense of class VI. Re-examined working list. It is III. 508. VI. 8 does not exist in the space assigned to it in catalogue.	697
		5.6	16 8	F; p L; g b M; irreg oval; r; 2½′ by 2′. If this be not VI. 8, there is no other near the place. [N.B.—It does not agree with the description of that cluster in my Father's catalogue, which states it to be 8′ or 9′ in diam; rich; v comp. The ✻ 26 x Virginis, by which its place is there determined, is a mistake for 577 of Mayer's catalogue.]	698
3579	....	14 35 44.8	103 13 7	v F; E; p s l b M; 20″..	702
3580	Δ. 356	14 36 49.7	143 48 29	cl VII. class; p rich; loose; irreg fig; 8′; st 10 and 11 m............	468
3581	....	14 38 15.2	104 8 17	p B; p m E; g p m b M; 80″....................................	702
3582	....	14 41 38.5	141 57 53	A small elongated close group of v S milky way st 3′ l, 1½′ br; so close and faint as to approach very near to the character of a nebula.	468
3583	....	14 48 1.5	131 20 ±	F; m E. In field with and n p A S C 1693 (κ Centauri). Place very rude	456
		....	....	Viewed, found in place, and seen, as described in *f* 456	457
3584	....	14 48 52.6	161 45 10	e F; S; R; b M; 15″	569
3585	....	14 49 59.1	141 14 12	a p L cl VII. class; coarse; not comp; chief D ✻ taken..............	468
3586	....	14 51 32.3	103 29 32	v F; S; E; g l b M	702
3587	I. 71	14 51 50.9	96 46 6	v B; S; p s v m b M; 15″; almost stellar.........................	609
		54.3	46 21	p B; R; s v m b M; 30″; hardly bright enough for a first class nebula..	697
3588	....	14 52 51.6	143 40 12	cl; v L; coarse, but rich and fine; diam in R A = 2 fields in P D 2½ (30′ and 45′); st 9, 10, 11, 12. General middle taken.	711
3589	....	14 53 7.9	144 55 6	cl VII. class; a fine L cl of separate stars 13...14 m, 10′ diam; not m comp M; nearly fills field.	694
3590	....	14 54 26.7	162 12 12	p F; p m E; g l b M; 35″ l, 20″ br. In a field full of st	597
		28.1	12 10	v F; l E; g l b M	598
		38.4	11 33	e F; p m E; 25″..	569
3591	....	14 56 19.8	154 0 55	p B; R; v g v l b M; 60″..	581
		20.1	1 14	p B; R; v g v l b M; 70″..	785
3592	....	14 56 48.8	125 40 9	v F; R; v g l b M; 20″...	792
		49.2	39 58	e F; E; v l b M; r; 15″ l	448
3593	III. 736	15 4 23.9	103 37 27	B; p m E; p s m b M; involves a ✻ 14 m to northward.............	702
3594	....	15 5 15.8	135 0 51	○; a most elegant and delicate PLANETARY NEBULA. Diam in R A = 1ˢ.35 by many observations. Long contemplated with 180, 240, and 320. The disc is magnified by the power in due proportion. It is = a ✻ 8.9 m; *perfectly sharp*, not the slightest haziness. A very fine objeet. It has no "satellites." My attendant, to whom I showed it, said it was like the moon, only smaller, and not in the least like a star.	464
		19.5	0 32	○; a clear round planetary white disc; at most 4″ diam. Has two stars 14 m near; one at dist 90″, pos 108.8; the other dist 120″, pos 60°.2. See fig. 8, Pl. VI.	695
3595	III. 116	15 5 53.0	99 26 18	p F; L; R; v g b M; 3′ diam....................................	698
3596	VI. 19	15 7 39.1	110 22 59	⊕; p F; v irr R; v g b M; all resolved into st 12....16 m; diam 5′ to 5½′.	722
3597	III. 138	15 8 8.2	113 25 ±	p B; R; p g b M; 15″. (P D ∵ tube resting on gallery.) [True P D = 113 29 40 probably. See the next nebula.]	453
3598	III. 139	15 8 38.4	113 22 ±	B; R; p g b M; 20″. (Tube resting on gallery.)....................	453
		39.7	26 40	p F; R; g p m b M; 30″	793
3599	III. 374 h. 1918	15 12 5.1	91 57 27	v F; l E; g b M; 25″ l, 20″ br..................................	608

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3600	....	15 12 12.7	102 28 12	B; S; R; g l b M; 15″. The preceding of 2	702
3601	....	15 12 17.2	102 32 37	F; l E; g l b M; 25″. The following of 2..........................	702
3602	....	15 12 27.4	96 44 32	e F; S; p s b M; 10″	609
3603	Δ. 357	15 14 43.8	143 56 5	A remarkable cluster, 20′ diam; R; very discrete, and composed of small groups of 2, 3, 4 stars, chiefly 11, 12, and 13 m, sufficiently insulated from the rest of the pretty rich neighbourhood to be considered a cluster.	469
		56.9	55 37	A most numerous and beautiful milky way group or cluster covering a space of $1\frac{1}{2}$ or 2 fields diameter (20′ or 30′), entirely composed of double and triple stars, and distinct groups of 4 or 5 nearly of a size (10 and 11 m), on a black ground. Perhaps 100 or 150 st in field.	468
		81.8	53 47	cl VIII. class. The field uniformly covered with insulated stars 11 ... 14 m, forming a rich cl of 8th class, remarkable for the total darkness of the ground and absence of minute stars. Cl much more than fills the field.	599
3604	Δ. 389	15 15 45.7	140 4 19	⊕; B; L; R; g b M; diam in R A = 16 sec. Comes up to a B blaze in M. Resolved by left eye. Stars 17 m.	467
		47.2	4 20	⊕; p B; fine highly condensed; v g b M; 3′ diam; clearly resolved. I see all the stars (15 m) well.	693
3605	....	15 20 46.4	156 16 19	F; S; among a crowd of milky way stars. No doubt as to its nebulous character. All that is starry in field is clearly resolved.	709
3606	II. 401 h. 1926	15 21 55.5	92 14 35	p B; S; R; g b M; 18″	608
3607	....	15 23 9.6	140 5 3	Not v B; S; g l b M; 90″; resolved into st 16 m, with one of 12 m, at or a little beyond the s p edge.	467
		10.9	5 2	p B; R; v g b M; 60″; a faint ∗ involved	693
3608	....	15 27 37.9	165 7 12	F; p L; R; v g b M; 2′..	704
3609	....	15 29 29.3	119 59 46	v F; L; R; g b M; r; 90″......................................	794
3610	....	15 33 22.0	150 40 55	PLANETARY NEBULA. Not B; p F; S; R; with something like a protuberance, which may arise from an accidental star, on or close to the edge. Not quite sharp; a little furred; light not quite uniform; an odd sort of mottling like a resolvable light; taken at first for a v F double ∗ out of focus; 12″ diam, but seen with 240; 320 is too high a power for it. See figure 7, Plate VI.	578
		24.6	40 47	○; seen, and a diagram of the adjacent stars made, but the stars are too dreadfully ill defined to-night to state any particulars further than that it is decidedly not a star, but has a disc 8″ ± diam.	716
		....	39 53	○; transit just missed; R; 5″ diam; about equal in light to a ∗ 9 m; of a feeble intensity of light, nearly equable; under 320 it is not *nebulous*, but indistinct at the edges; a very singular kind of appearance—not "*mottled*," not "curdled," but yet not planetary. In a field with about 100 or 150 st.	596
3611	Δ. 552	15 34 55.8	127 13 15	⊕; v B; R; v g b M; diam in R A 10^s; all stars; a ∗ 10 m follows centre $4^s.0$, and is involved; 3 st 13 m in M.	462
		56.8	13 17	⊕; fine object; p g b M; diam $15^s.0$; composed of distinct st 13..15 m; one ∗ 10 m is eccentric, and 3 of 13 m in centre nearly.	461
3612	Δ. 343	15 38 45.9	145 57 0	cl VI. class. A p rich l cl; R; l comp M; 12′; st 12 ... 14 m; nearly fills field; M taken.	469
3613	....	15 38 58.9	103 13 32	e F; S; R; follows a v S ∗; 25″	702
3614	....	15 39 10.8	118 51 38	v F; S; R; s b M..	451
3615	Δ. 334	15 42 5.3	146 56 16	cl VI. or VII. class; p m comp; irreg fig; 5′ or 6′ diam; st 12.... 16 m.	696
		12.0	54 49	cl; S; irreg R; g b M; a group, or rather small oval p m comp cl of st 16 ... 17 m. A few = 15 m.	694
		15.6	55 14	A milky way cl; but so densely concentrated as to merit notice as a fine cl VI. class; irreg R; g b M; st 11....15 m. [This obs makes the minute of R A 41.]	469
3616	Δ. 304	15 49 17.4	150 0 40	L, brill cl VII. class; fills field; not rich; st 8, 9, 10, 11 m, with smaller. Chief ∗ 8 m taken; in the southern part of cl.	582
		18.4	0 41	VII.; loose; sc; brill; stars large; much more than fills field; 46 st counted above 12 m; chief ∗ 7 m taken.	575
		20.0	0 55	Chief ∗ 8 m of a coarse, p L, cl of st, 8....11 m, which fills the field....	717
		21.2	0 45	Chief ∗ 7 m of a L, oblong, B, sc cl; st 7....10 m	578
3617	....	15 50 23.1	124 3 23	F; S; R; 15″; g p m b M. There are 3 st forming a triangle about 60°, n p the neb.	792

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3618	Δ. 359	15 54 24.1	143 33 24	cl; a small, compact, knot of st 11....14 m, in a magnificently full field and zone.	599
3619	Δ. 360	15 59 58.2	143 46 31	The chief ✱ in middle of a most superbly rich and L cl, 20′ at least in diam, as it much more than fills field; not m comp M; st 10....12 m.	469
		59.5	45 30	Chief D star of a superb cl; 15′ diam; g m comp M; irreg R; st 10....15 m.	696
		....	45 30	Place of a neat D star in centre of a superb cl; very L and rich; composed of equal stars 12 m, a fine object. Much more than fills field.	694
3620	....	16 1 47.0	125 47 53	p F; R; v g v l b M; 60″; with left eye slightly mottled, but not resolved	791
3621	....	16 4 37.5	123 48 20	e F; E; l b m; 25″..........	791
3622	Δ. 326	16 4 46.1	147 28 0	cl VIII. class; L; loose; brill; irreg fig; fills field; chief ✱ 7′ m taken	575
		49.7	28 4	cl VIII.; L; coarse; B; fills field; st 7, 8, 9, 10 m; ✱ 7′ m taken. N.B.—This obs makes the minute of R A 5, instead of 4.	717
3623	Δ. 68	16 6 29.7	161 47 39	⊕; L; F; R; v g l b M; all resolved into st 15....18 m; 4′ diam, with stragglers. A delicate and beautiful object.	598
		30.2	47 4	⊕; p B; L; irr R; g b M; resolved into st 13....16 m; rich; p comp; diam 5′ or 6′ by estim; 50ˢ ± in R A. A fine object. [N.B.—*This obs makes the minute of* R A 7, *instead of* 6.]	605
		38.3	47 12	F; L; irr R; v g b M; 7′ or 8′ diam; all res into stars	606
3624	....	16 6 54.8	112 33 26	⊕; v B; R; s v v m b M to a blaze; diam in R A = 10ˢ.5. Stars 15 m, all well seen.	793
		55.0	32 27	⊕; v m comp M; p s v m b M; diam 12ˢ.0; st = 14 m; all resolved. Fine object.	588
3625	....	16 11 24.8	141 32 21	A part of the milky way, so immensely rich as to be one vast cluster of clusters.	468
3626	Δ. 514	16 13 58.4	130 15 46	cl; B; L; loosely sc; not m comp M; fills nearly a field; consists of about 50 or 60 st 9....11 m.	479
		....	....	Viewed; a brilliant cluster class VII.; p rich L; irreg sc; fills field; st 8, 9, 10, 11 m.	456
3627	Δ. 412	16 15 3.1	138 44 48	A p rich, loose, L; roundish cl of st 12....14 m; 7′ diam; not m comp M	465
		10.6	45 36	VII. class; rich; L; g l comp M; irreg R; 12′; st 13, 14, 15 m; nearly fills field.	693
3628	Δ. 536	16 16 12.5	128 27 20	p B; R; p g b M; r; with left eye I can barely discern a few of the stars	461
		13.9	27 10	B; R; p g b M; r; 2′	460
		14.7	26 0	v B; R; p L; p g m b M; 2½. Evidently a ⊕, but ☽ v B and near full, and I cannot see the individual stars.	459
		....	26 25	B; R; p s b M; 200″; r. [R A by this obs 20ˢ.5, but the eye-piece has been considerably deranged by a blow.]	462
3629	VI. 10	16 16 53.3	115 38 51	p L; oval; g b M; resolved	453
3630	....	16 18 9.1	162 52 58	v F and S; is pointed to by 2 small stars 9 m and 14 m; the ✱ 9 m is the only one of that magnitude within 6′.	606
3631	....	16 19 30.3	142 14 53	A large and coarse milky way cluster, tolerably insulated, composed of large stars.	468
3632	....	16 19 57.2	150 13 31	p F; R; g p m b M; 45″; in a field full of small stars..........	596
		61.8	14 25	p F; l E; g l b M; 50″ l	578
3633	....	16 21 10±	137 44 ±	Neb violently suspected immediately preceding a double star	463
3634	....	16 21 27.7	137 47 19	F; S; l E; v g l b M; 35″; certain; follows a D ✱	463
3635	Δ. 400	16 21 35.7	139 23 47	L irreg cl of loose st 11....14 m, which fills field; place that of a ✱ 8 m in preceding part.	693
3636	....	16 21 59.9	133 40 17	Cluster; place of a ✱ μ Normæ in it..........	454
3637	VI. 40	16 23 2.5	102 40 17	⊕; v rich; g p m b M; diam in R A = 20ˢ.0; that of the most comp part 4ˢ.5; stars well separated.	702
3638	....	16 23 22.5	135 15 40	Middle of a small group of p B stars	472
		31.1	15 4	Chief ✱ 9 m of a S B clustering group of from 12 to 20 p L st, with stragglers.	695
3639	....	16 23 41.2	159 1 0	v F; e S; R; g b M; 10″	579

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3640	Δ. 413	16 27 ±	138 40 ±	The brightest part of a v L, f, diffused, branching nebula, which involves in its n f part the * B 5789, and extends into the cl Δ 413, which it in part surrounds. No doubt about the nebula, which in the brightest part of it precedes the cluster about 1^m of time. The following stars behind the double *, and quite free of nebula. I presume the neb and cluster to be unconnected.	693
3641	Δ. 483	16 28 18.0	133 1 39	A coarse but rich cl of st 11..12 m, which leaves dark lines unoccupied, forming sections. (See fig. 4, Pl. V.)	455
		26.7	1 27	cl VII. p rich; irreg R; g b M; 10′; st 12...14 m; a straggling group.	454
3642	Δ. 413	16 28 37.8	138 25 19	cl VIII. class; consists of about a dozen st 10..11 m, and perhaps as many less, with stragglers, which fill field. In its p part is a fine D * (place as here set down), and yet more p is a v L, faint nebula, in which the p part of the cl is involved.	693
3643	....	16 31 37.7	137 8 13	A great space full of milky way stars, so thickly sown as to merit being called a cluster.	463
3644	Δ. 442	16 33 42.9	136 41 55	cl moderately comp VIII. class; st 11...12 m; s f is a brilliant knot of st, one of which is 8 m, and the others 9 m.	463
		66.0	42 15	A singular shaped cl. Irreg R; comp VII. class, set as it were in a nearly rectangular frame of stars detached from cluster. See fig 6, Pl. V.	695
3645	....	16 34 52.8	162 17 8	e F; p L; v g v l b M; 2′ diam; quite hopeless, except in the clearest and finest night, and with the mirror bright.	605
		....	....	Found in the place, and viewed. It is very visible, and the P D is right per index.	606
3646	Δ. 364	16 35 49.6	143 26 23	A pretty insulated milky way cluster, class VII. of large stars; 8′ diam; st 9....12 m.	468
		60.5	33 42	Cluster, class VII.; rich; not m comp M; more than fills field. Stars 11....14 m, but chiefly small.	599
3647	....	16 36 29.1	148 41 24	p F; R; v g l b M; has a yellow * 5 m preceding it, 1^m 19^s ±, Δ R A, and 3′ or 4′ south.	717
3648	Δ. 454	16 37 9.4	134 25 7	A round cl of st 13 m; g b M; 4′; with two appendages of st, n and s, making together a long cluster.	463
		10.0	24 50	p rich; R; p comp M; v l b M; 4′ diam; stars discrete 12....15 m	472
		12.3	24 42	A p rich cl of S st, 11 m and under, broken up into 2 or 3 groups; fills ⅔ of field.	454
3649	....	16 38 1.5	148 54 27	⊕; p B; p L; R; g b M; 2½′; barely resolvable	712
		7.6	54 57	p F; L; R; g l b M; 80″	582
		....	....	⊕; viewed in place, but clouded over before any description could be made.	717
3650	....	16 38 32.1	134 25 13	A v L, v rich cl; not brilliant; not materially comp M; full 20′ diam; st 12..13 m.	455
3651	....	16 39 46.8	130 55 24	A star 5 m in a great cl, or an immensely rich milky way patch	456
3652	Δ. 499	16 42 8.6	131 30 26	A fine B, L cl; p rich; class VII.; 10′; st 10..13 m. Place of a D * 5 m, the p but one of 7 B st in M.	479
3653	III. 584	16 43 13.5	111 52 37	p comp; S; 2′; rather triangular than R; m b M; resolved into st 14...16 m.	588
3654	Δ. 520	16 43 58.3	129 13 9	Cluster VI. class; B; L; rich; discrete; 12′; irreg fig; v l b M; fine object; place of a red * 9 m; rest 11 m; white.	461
		61.8	12 15	A fine, L, rich cl; class VII.; st 9....12 m; fills field; place of a red * 8.9 m in centre.	462
		....	13 46	A p rich brill cl of st 10....12 m, with one 7.8 m near middle	456
3655	....	16 45 23.6	134 29 57	cl VIII. class; coarse; p rich; st 9....12 m	454
		24.5	30 30	VII. class; p rich; loose irreg fig; L and S st, 9......15 m; 10′ l, 7′ br.	472
3656	....	16 45 28.8	135 38 56	cl VIII. class; loose and straggling; place that of a D * in central more condensed group; has a * 8 m s f, 5′ dist, and another 7 m more remote.	463
		30.2	39 40	The chief and central group of a L loose cl, whose outlying st are = 8 m, the central ones = 12 m; a double * taken.	464
3657	Δ. 374 ?	16 45 41.0	142 25 50	A small triangular cl, 2′ diam; st = 13 m..........................	468

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3658	....	16 48 7.1	126 51 0	⊕; e F; v L; v g l b M; 4′ diam; perceived with the utmost attention to be resolved into v S stars 20 m.	461
		8.1	50 10	VI. class. A v L neb, or rather v F, R cl VI. class; v F; irreg R; v g l b M; 4′.	462
3659	M. 10 h. 1972	16 48 13.4	93 48 35	⊕; fine, L; R; B; g m b M; diam 5′; with stragglers, several of which are of larger sizes, to about 12′ diam; all resolved into st 11....15 m, very comp.	608
3660	Δ. 456	16 48 22.0	134 22 42	A superb, v L, v rich cl, which fills field; R; v g l b M; st 11..12 m, thickly sown at intervals from each other from 10″ to 20″.	454
		27.9	24 0	v L; v rich; fills more than a field; has one or two straggling appendages p and s; stars 11 and 12 m, nearly equal.	472
3661	M. 62 Δ. 627	16 50 21.9	119 50 48	⊕; B; L; R; g m b M, but not to a nucleus; st 15 m; v fine; diam in R A = 13ˢ.0. [*Semi-diam*—See *f* 794.]	477
		23.6	50 42	⊕; superb; v B; R; p s v m b M; about 7′ diam; all resolved into stars 15 m, very equal.	723
		24.2	50 18	⊕; v B; L; R; p g v m b M; perfectly resolved with left eye, hardly with right. The most condensed part is a perfect blaze, but not quite in the centre. The southern part runs out farther. A beautiful object. (See figure 13, Pl. VI.) Diam = 13ˢ.5 in R A. [*No doubt semi-diameter.*]	451
		25.9	51 2	⊕; v B; L; R; g v m b M, to a blaze; diam in R A = 27ˢ.0; st 14....16 m; superb.	794
		26.6	51 23	B; L; R or l E, towards the n f side, where there is even some feeble appearance of another centre of condensation; p s b M, almost to a nipple; st 15 m.	478
3662	Δ. 521	16 50 21.0	129 28 10	cl; rich; p L; brilliant; 8′; st irreg sc 10... 12 m; place of a D ∗ in the following angle of a triangular condensed group.	456
		23.2	27 41	A p rich irreg cl of nearly = st 10 m; not m b M; 7′..................	479
3663	M. 19 h. 1975	16 52 7.9	116 0 51	⊕; v B; R; diam 10′; resolved into st 16 m	453
		9.8	0 52	Superb ⊕; g m b M, but not to a nucleus; diam of B part = 12ˢ.0, of whole cl to edge = 17ˢ.0; resolved into st 14, 15, 16 m.	474
3664	Δ. 556	16 53 14.3	127 38 12	A p rich, L, p B, cl VII. class, of loose st 9, 10, 11 m, which fills ⅔ of field.	461
3665	VI. 11 h. 1976	16 54 4.0	114 30 57	⊕; B; R; g b M; diam = 7ˢ.0; resolved into st 16 m	453
3666	II. 195	16 54 55.3	112 27 29	⊕; irreg R; g p m comp M; 3′ diam; barely resolved into st 16... 18 m.	588
3667	VI. 12 h. 1977	16 59 35.6	116 21 30	⊕; B; R; p s b M; diam 7ˢ.0; resolved into st 16 m	453
		39.8	20 36	⊕; p B; R; p s v m b M; 3½′; resolved into st 15..16 m	723
3668	....	17 1 3.7	152 36 49	F; R or l E; v g l b M; diam in R A = 23ˢ.; has in it 2 stars and a 3rd, with 2 or 3 more outlying.	600
		4.7	36 35	F; v L; R; v g v l b M; 3′; has several stars, one = 11 m; involved but being on a rich ground there appears no connection.	480
3669	....	17 3 9.1	148 58 5	v F; v S; R; g l b M; 12″....................................	712
3670	I. 147	17 3 45.7	119 15 27	⊕; B; R; g b M; diam in R A = 6ˢ.0; res into st 16... 17 m........	477
		46.4	14 32	B; R; at first s, then v g l b M; brighter part 2′ diam; but there is a much fainter portion which extends a good deal further; st 16... 17 m.	478
3671	I. 45	17 5 54.6	117 56 12	⊕; p B; S; R; p g v m b M; 2′; resolved into st 16..17 m	723
		57.4	56 17	⊕; B; R; g b M; r; 90″; has 2 small st very near	475
3672	Δ. 522	17 6 ±	129 15 ±	cl VII. class. Rich; p L; R; g b M; st 12....14 m; not a ⊕	456
3673	....	17 6 35.9	132 41 33	Coarse B cluster VII. mainly included within an equilateral triangle formed by 3 B st 5 and 6 m. The n f of these taken.	455
		37.3	41 7	v L cl VII. class, of loose st, on a v rich ground of S st. The chief ∗, 6 m, at the n f edge taken.	454
3674	....	17 7 0.4	154 49 31	v F; v S; l E; l b M; 15″ l, 12″ br	600
		3.3	49 9	v F; R; g b M; 15″..	581

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3675	....	17 7 17.4	141 33 8	PLANETARY NEBULA. A perfectly uniform, quite round, planetary disc; like a star out of focus. A very little uncertain at the edges, like a star on a dewy unsettled calm night, when the stars look large without being decidedly ill defined. Diameter = 5″; light = a ✱ 9.10 m. There is positively no bright point in the centre. It has two very small attendant stars, one 14 m; pos from centre = 352°.3, dist from edge = ¾ diam; the other also 14 m, pos 96°.7 dist from edge = 1½ diam. Occurs in a field full of milky way stars. [N.B.—Referring to the description of Δ 381, I see no ground to suppose that this can by possibility have been the object intended by that place and description. At all events, the remarkable planetary character has escaped notice by the author of that description.] See fig. 6, Pl. VI.	789
		21.2	33 40	○; delicate; F; v S; diam = 6″ or 7″; exactly R; perfectly uniform [as respects the graduation of the light from the centre to the edges], but the light a very little curdled. Not the slightest *haziness*, but like a star out of focus. 320 shows rather more fur at the edges than I think it would to a planet of equal size and light. Its light is = a ✱ 10.11 m. It would be quite useless to look for this object under less favourable circumstances—of instrument and sky. A night of gloriously perfect definition! It is in a very rich place. There are 40 or 50 small stars in field. Measures of the two companions; 1st pos = 351°.0, dist = 1 diam from edge, ✱ = 14 m; 2nd pos = 91°.4, dist = ⅔ diam, ✱ = 13 m. Showed it to my attendant, J. S., who saw it well.	599
		....	....	Viewed. I can barely discern that the attendant stars are as in ∫ 599, but it is so faint that (the stars being all blotty and dreadfully defined) I could not be sure it was the object, till too late to take its R A and P D on the wires. However, it was just in the middle of the field at the time expected, and set to the place at once.	714
3676	....	17 7 41.6	113 33 43	p F; R; g b M; r; 60″. No doubt it is a ⊕	588
3677	M. 9 h. 1979	17 9 12.4	108 20 55	⊕; B; R; g m b M; 4′; resolved into st 14 m	699
3678	....	17 9 30.4	125 52 36	p B; v L; v irr oval, in which, though excentric, is a ✱ 8 m, whose place is that taken. One side of the neb is brighter than the other.	791
		32.2	53 12	v F; v L; v g l b M; 5′ l; 4′ br; out of M is a ✱ 8.9 or 9 m, whose place is taken. The densest part of the nebula follows this ✱ 4ˢ.5 on the same parallel.	792
3679	....	17 9 41±	123 58 ±	The whole lower end of the zone is strongly affected with nebulous patches	794
3680	....	17 10 35.8	128 17 42	ANNULAR NEBULA. A delicate, e F, but perfectly well defined annulus 15....20″ diam. The field crowded with st, two of which are on the neb. (See fig. 3, Pl. VI.)	461
		37.0	18 28	A beautiful delicate ring, of a faint ghost-like appearance, about 40″ diam; in a field of about 150 st, 11 and 12 m and under. *In* it is one ✱ 12 m very conspic, and one 15 m much less so. Near it are 2 st 14 and 15 m, and s of it at dist 60″ is another.	718
		37.6	17 50	e e F and difficult object; among a crowd of milky way stars. My attendant, J. S., saw the darkness in the centre and the stars as described. [N.B.—Set by working list to P D of last ∫, and entered the field bisected by the horizontal wire.]	462
3681	I. 46	17 13 24.6	116 10 50	v F; L; R; g b M; 2′ diam; res st 18 m	453
3682	....	17 13 29.2	124 1 14	F; L; E; v g l b M; milky nebulosity; 2′ l; 1½′ br; close to and almost involves a D ✱.	792
3683	I. 48	17 13 38.5	107 38 30	⊕; v B; R; v g v m b M; 90″; resolved into stars barely discernible with left eye. A beautiful softly shaded object.	699
3684	Δ. 225	17 14 17.2	156 54 28	⊕; B; L; R; v g m b M; diam in R A = 50ˢ; diam 7′ or 8′; stars all seen, 12....16 m with outliers extending a good way.	612
		19.5	53 37	⊕; irreg R; p B and L; g b M; 4′; all sharply resolved into stars 14..17 m	709
——	....	17 14 33.2	132 39 37	The edge of the milky way is here quite sharp and definite, forming a telescopic promontory and bays, all above which is a mass of stars, and all below vacant to some considerable distance. See Pl. V., fig. 3.	454
3685	....	17 14 33.1	119 49 47	A portion of the milky way which is decidedly nebulous, and by no means rich in L stars. The nebula is in patches of very great extent.	478
3686	IV. 11 h. 1981	17 19 2.0	113 36 35	ANNULAR NEBULA. Exactly round; p F; 12″ diameter; well terminated, but a very little cottony at the edge, and with a decided darkness in the middle; = a ✱ 10 m at the most. Few stars in the field; a beautiful specimen of the planetary annular class of nebulæ, (fig. 4, Pl. VI.).	793
3687	....	17 21 0.7	122 27 15	Cluster VIII. class; 3′ or 4′ in extent; a bright ✱ (= B 6125) taken	794

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3688	....	17 22 43.1	128 56 33	A star 9 m, with an extremely F nebulous wisp or tail, extending northwards about 1′.	718
		....	....	A star 9 m, with a very evident e F nebulous wisp 90″ l; 30″ br. [The wisp by the diagram is fan-shaped, and extends in the n p direction from the star. See fig. 18, Pl. VI.].	462
3689	....	17 23 36.2	122 26 31	A star 7 m with a cl of st 12 m assembled about it. The great * occupies the centre. A very remarkable object.	791
		36.6	27 50	A curious cluster consisting of one L * 6.7 m, and some 15 or 20 small ones 13 m clustering close around it.	478
3690	Δ. 457	17 23 51.6	134 36 26	⊕; v B; R; first p g, then p s v m b M; 4′ diam; easily resolved with left eye into st 17 m; more difficultly with right eye into 18 m; excessively close and comp; shading off insensibly in borders into the general ground of the heavens.	463
		52.0	37 48	⊕; v B; R; at first p g, then p s v m b M to an intense almost nuclear light. The right eye does not resolve or barely makes it resolvable; the left resolves it completely into stars 17....20 m. A superb object on a rich ground of milky way.	455
3691	....	17 24 37.6	159 39 42	p F; S; R; g l b M; 20″; 50 stars in field..........................	597
		38.7	40 19	F; S; R; g l b M; 20″; has a * 13 m s p (one radius of neb from edge by diagram.)	598
3692	Δ. 366	17 26 50.4	143 34 15	⊕; fine, L; B; R; g b M; not v comp; 5′ diam, but stragglers extend a great way. In M is a more comp group of much smaller st. The stars at circumference are larger than in M; at n f border is a D *.	468
		51.9	33 22	Beautiful ⊕; L, rich, somewhat coarse; 10′ diam taking in all outliers; rather irreg R; v m comp M where, however, the st are v S, while every where else they are 13 m.	789
		....	....	Viewed past merid; a fine, L, rich cl; not v m comp stars 13 m. In the s f part is a delicate double *.	696
3693	....	17 26 51.1	124 53 31	Cluster VIII.; small; 5′; place of chief D *.........................	791
3694	....	17 27 2.8	151 34 51	e F; S; R; almost certain it is not a small D *. Definition much improved. It is certainly a nebula, and, with long attention, I see another, still fainter, exactly on parallel, and 30ˢ follows.	716
3695	....	17 27 33±	151 34 51	e e F. The following of 2	716
3696	Δ. 568	17 27 59.9	126 49 53	Cl class VII. p rich; p L; irr R; 8′; st 9...10 m	461
3697	I. 44 h. 1982	17 28 14.4	113 47 46	p B; R; v g b M; 25″; a * 13 m involved, following the centre	453
		17.3	47 49	p B; R; v g b M; 2′; has a * 11 m, rather following the middle	793
3698	M. 14 h. 1983	17 28 41.0	93 7 55	A most beautiful and delicate ⊕; not v B, but of the finest star-dust; all well resolved, especially with the left eye; v g m b M; diam in R A = 15 *sec;* excessively rich. All the stars = and 15 or 16 m.	608
3699	M. 6	17 28 58.6	122 5 52	Chief * 7 m of a fine L, discrete cl of st 10....11 m; one * is 7 m, one 7.8. Fills field; VIII. class.	478
3700	....	17 29 31.9	150 38 31	e F; S; R; l b M; 15″; near 3 st................................	480
		....	....	Found in place, and seen as described................................	481
3701	....	17 29 55.0	175 23 48	p B; R; v g b M. R A rudely taken, and may be very erroneous.	595
——	....	17 32 ±	124 55 30	A great *Nebulous* projection of the milky way	791
3702	Δ. 612	17 33 6.2	122 14 33	Cl class VIII. of st 11 m; fills field; not rich; stars in zig-zag lines	478
		17.5	17 15	Coarse, rich, v L cluster. More than fills field. Stars 8....12 m; one of 8 m taken.	794
——	....	17 34 31.4	123 36 35	A most remarkable, well insulated, semi-nebulous milky way patch of a branching rounded fig., within the limits of the field, quite insulated on the p, n, and f side, and only connected on the S side by a narrow isthmus with a branch of the milky way, which runs meridionally to a great extent. It forms a VI. class cluster of the utmost tenuity, barely resolv*able,* not resolv*ed.* See fig. 1, Plate V.	792
3703	....	17 35 59.8	121 27 4	Small cl VIII. class; 8′ diam; has 20 or 30 st 10....12 m, nearly insulated.	478
3704	....	17 37 39—	125 22 ±	A very decided, tolerably defined semi-nebulous mass in milky way, with abundance of v S st, forming altogether a telescopic magellanic cloud. It fills about a field, and has branches and sinuses, and is altogether a very remarkable object.	791

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3705	Δ. 557	17 38 38.5	126 59 10	⊕; v B; R; v g b M, up to a blaze. In field with γ Telescopii, and nearly on the same parallel; with left eye I barely see it resolved into st 18 or 20 m. The whole *ground* of the heavens, for an immense extent, is thickly sown with such st. A beautiful object.	462
		40.2	59 16	⊕; B; R; 90″; v g b M; r (barely so); a very regularly graduating neb or cl; in field with γ Telescopii.	461
3706	Δ. 597?	17 38 55±	124 48 ±	A v fine L, rich sc cl of st 12..13..m; P xvii. 254....................	791
3707	VI. 13	17 39 40.2	120 9 45	p rich; irreg R; st 13 m; a cluster with a great black cut across it; 6′ diam, with many outliers.	794
		50.0	9 11	A remarkable cluster, divided into two by a broad vacant straight band; irreg R; 8′ diam; st 12...15 m. See fig. 5, Pl. V.	478
——	....	17 40 0±	118 42 ±	Here begins an enormous region of stars, crowded beyond counting, in the milky way.	723
3708	M. 7?	17 40 ±	124 34	A highly condensed nebulous mass, 3′ diam, or an irreg R neb; p m b M; r.	792
3709	....	17 40 37±	125 20 ±	A very extensive nebulous clustering mass of the milky way. The stars of excessive smallness, and infinite in number.	791
3710	....	17 42 39.6	124 46 21	A brill coarse cl VIII. class, of about 60 st 7.8....12 m, which fills field. Irreg fig. A ✻ 8 m taken.	592
		....	45 40	cl VIII. Very fine and brilliant; stars of very large and mixed magnitudes. Fills field.	791
3711	....	17 42 41.1	112 16 46	A pretty rich insulated milky way cluster; place of a coarse double ✻ in it. The milky way hereabouts is very poor.	793
3712	....	17 43 0±	119 5 ±	Nebula. No description. It is probably only a nebulous portion of the milky way.	723
3713	....	17 43 8.3	153 37 31	F; S; E; b M; between 2 st 10 m 45° s p and n f (diagram)..........	708
——	....	17 43 40.9	120 23 22	An extraordinary B nebulous portion of the milky way, on a black ground v L; an angle taken where there is a ✻ 12 m. [See fig. 2, Pl. V., copied from a diagram made at the time, which represents this remarkable and instructive object as marked by a well defined contour.]	794
——	....	17 44 28.8	120 19 37	The milky way here is so sharply terminated, that the southern half of the field has few stars, while the northern is so full as to be almost nebulous.	478
3714	....	17 45 27.2	156 24 18	p F; S; p m E, in direction of the parallel; precedes a ✻ 12 m, which is all but involved.	612
3715	Δ. 460? Δ. 461?	17 46 40.0	134 13 18	A distinctly nebulous insulated group; m E; 2′ l; 90″ br; many stars of considerable size, mixed.	455
		40.5	13 37	cl v rich; irreg R, inclining to triangular; v g l b M; 4′ or 5′ diam; with many large and small st in it. Nebulous.	454
3716	....	17 47 19.5	155 23 29	v F; 30″; involves 2 or 3 stars....................................	708
		21.1	23 47	The following star (14 m) of a v F double ✻ 11 m is nebulous. The nebula is excessively faint, but I am sure of its existence. The preceding star is free.	600
——	....	17 47 57.5	119 22 49	The southern extremity of a great nebulous promontory of the milky way, which projects into the field as the Cape of Good Hope, on a map, does into the southern ocean.	478
3717	....	17 49 20.0	114 38 4	A very loose but very rich cluster, which fills many fields. Stars small..	474
3718	IV. 41 h. 1991	17 52 4.9	113 1 21	The triple star in the trifid nebula	793
		6.6	1 32	One of the most remarkable nebulæ, and must be very carefully delineated. It is very large, and has many outlying portions and sinuses. See fig. 2, Pl. II.	588
3719	II. 199	17 52 34.9	98 55 52	p B; R; g p m b M; 40″..	721
		35.8	56 58	⊕; F; R; p s b M; 90″; r; with left eye I discern the stars in it	591
3720	I. 49	17 52 41.7	120 1 12	⊕; B; R; g v m b M; in a nebuloid portion of the milky way; resolved; stars 16..17 m.	794
		41.9	1 26	⊕; p B; S; R; 80″; resolved into st 16 m. (See the remark on II. 200. R A 17^h 54^m.)	478
3721	VII. 7	17 52 43.0	117 53 22	A pretty compact cl class VII. of st 9....13 m; irreg sc diam 4′........	723
3722	M. 8	17 53 25.1	114 21 0	A ✻ 6 m (A c 2074) within the arch of the great nebula M 8............	453
		27.6	21 4	A noble nebula; to be monographed. The star taken is A c 2074 = 9 Sagittarii 7 m. It is followed by a great cluster VI. 13 of which with the nebula fills many fields.	474
		53 30.1	21 13	Superb nebula. The star A taken. See Pl. I. fig. 1	793

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3723	II. 200	17 53 54.2	120 2 58	⊕; p B; R; g b M; resolved into st 16 . . 17 m; in a nebuloid of the milky way.	794
		58.3	3 36	⊕; B; S; R; g l b M″; resolved into st 16 m. Both this and I. 49 occur on a ground so astonishingly rich and stippled over with stars 17 m individually discernible, as hardly to admit a pin's point between the stars, and this fills more than the whole field or many fields.	478
3724	Δ. 569	17 54 ±	126 18 ±	A large milky way patch, much compressed, one portion much more so	792
3725	. . . .	17 54 14.4	114 19 11	Cl L and B; just fills field; a D ✱ taken. This cluster follows M 8	453
		17.1	20 34	A B, p Rich, irreg R cl; place that of a double ✱ in the following part of the cluster, which is itself involved in the great nebula M 8.	474
3726	Δ. 473	17 55 39.8	133 44 31	⊕; B; R; g b M; diam in R A = 6ˢ.0; easily resolvable. The left eye resolves it. [Query semi-diameter.]	455
		41.0	42 17	⊕; B; R; e comp; v Fine; diameter of most comp part = 11ˢ.0 of time in R A; st 15 . . 16 m. The scattered stars extend to three times the diameter and die away very gradually.	454
3727	. . . .	17 55 52.2	153 47 30	e e e F; v v v S; R; 4″. This is the smallest nebula I recollect to have seen. Its light is not greater than that of a ✱ 14 m. A diagram made for security of finding it again. See fig. 16, Pl. VI. ✱ No. 1 = 10 m; 2 = 3 = 12 m; 4 = 13 m; 5 = 6 = 7 = 14 m; 8 = 16 m.	600
3728	. . . .	17 56 50.7	166 36 50	v F; R; g l b M; 15″	607
3729	. . . .	17 56 58.1	113 14 —	The middle of a great and rich cluster in the milky way	793
3730	VI. 12	17 58 52.5	115 56 23	⊕; v F; a little oval; v g l b M; barely r; st 20 m; one ✱ 14 m; diam in R A = 7ˢ.5.	453
3731	. . . .	17 59 13.1	121 46 42	⊕; p B; irreg R; g m b M; composed of st 16 m, on a milky way ground of mixed L and v S stars. [P D by obs 120, but this is an obvious mistake, as both the other obs make it 121.]	794
		15.8	46 29	⊕; p B; R; g b M; 80″; resolvable or resolved in a field very full of milky way stars.	619
		16.6	47 41	⊕; not v B; R; g l b M; 2′; resolved. The stars barely discernible . .	478
3732	. . . .	17 59 16.7	117 32 38	Cl VI. An oval patch comprised within limits of the field, barely resolvable into infinitely minute points, but which, without attention, appears as a great neb 15′ l; 12′ br; hardly b M.	723
3733	h. 1996	17 59 34.4	114 7 47	v F; L; oblong; 5′ l; 3′ br; place of a D ✱ involved; 6 other st near. Query, if involved.	793
3734	. . . .	18 0 48.2	123 54 15	PLANETARY NEBULA; l elliptic; hazy at borders; seen as last night. [See next obs.]	792
		48.6	53 6	A L, F, oval, PLANETARY NEBULA, about 60″ l; 50″ br; or 55″; considerably hazy, or rather *indistinctly* terminated at the borders, but not b M; a star 6.7 m precedes it, just 1 diameter of the field and nearly in the parallel.	791
3735	VII. 30 h. 1998	18 2 32.8	111 39 27	Cluster VIII. class; loose; sc; fills field; is decidedly richer than any part of the milky way that has occurred to-night.	588
3736	II. 201 Δ. 619	18 2 35.1	121 51 39	⊕; p B; L; R; g l b M; 4′ diam; resolved into st 15 m	478
		36.7	50 52	⊕; v B; L; R; g b M; 3′; resolved. In milky way	619
		36.8	51 18	⊕; p B; R; v g l b M; $3\frac{1}{2}$′; resolved	794
		. . . .	51 30	Found in equatorial in a zone review for double stars, where it appeared as a F R neb 1′ diam. July 16, 1836.	
3737	Δ. 376	18 5 0.6	142 16 0	⊕; B; R; g m b M; entirely resolved into st 16 m; easily seen	468
		0.9	15 14	⊕; p B; R; g p m b M; $2\frac{1}{2}$′ or 3′ diam; easily resolved with left eye into st 15 m.	789
3738	. . . .	18 5 3.1	153 51 44	e F; S; among st. A ✱ 6′ m s p 10′ distant	708
3739	VII. 31 h. 2001	18 5 34.1	112 11 2	Oblong cluster, not v rich nor v comp, but well insulated; st 13 m; 5′ l; 4′ br.	793
——	. . . .	18 8 10±	121 59 55	Milky way superb. I cannot count the field, but by estimating the number in a small space, there can hardly be less than 1000 stars in it. By the best judgment I can form, they are not more than 20″ asunder.	478
3740	VIII. 15	18 8 33.3	102 17 40	A poor cl class VIII. having coarse stragglers to a great distance. The chief ✱ 7′ m taken.	617
3741	. . . .	18 8 52.4	153 17 42	F; S; R; p g b M; 15″	708
		54.8	19 5	e F; S; R; or v l E; v l b M; it follows a ✱ 9 m about 7 or 8ˢ of time, and is about 3′ S of it.	600

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3742	I. 50	18 12 44.2	120 25 32	⊕; v B; R; p s v m b M; diam in R A = 5ˢ.0; all clearly resolved into stars barely discernible.	619
		47.0	26 48	⊕; B; S; R; p s m b M; diam 6ˢ in R A; barely resolved so as to be sure it consists of stars.	478
		47.3	26 4	⊕; B; R; at first g, then p s v m b M; 3½′ or 4′ diameter; clearly resolved into st 16 m; a fine object.	794
3743	M. 28 h. 2010	18 14 4.6	114 57 1	⊕; v B; R; v m comp; g b M, but not to a nipple; diam in R A = 12ˢ.0; resolved into st 14 . . . . 16 m; a fine object. Occurs in the milky way, of which the stars here are barely visible and immensely numerous.	474
3744	II. 204?	18 15 24.0	113 17 19	p B; v S; 4″ at the utmost in diameter; a good deal furry at the edges, and ? if not a little brighter in M. It is not a "Stellar Nebula," but rather a link between a ○ and a ⊕; is probably a v distant and highly comp ⊕; has a ✱ 9 m 3′ dist, s f; night superb and vision perfect. This is one of the smallest if not the very smallest *nebulous* object I remember to have seen. It is a very remarkable object.	793
3745	....	18 16 20.2	153 23 18	p F; S; R; g b M; 15″..	708
3746	....	18 17 42.7	102 7 36	cl VII. class; p rich; 5′ diam, with appendages, st 12 . . . . 15 m. Much richer than any part of the milky way seen to-night.	719
3747	M. 69 Δ. 613	18 20 14.1	122 27 51	⊕; B; R; v g b M; resolved into st 14 . . 15; diam 10ˢ.0 in R A	477
		16.3	27 11	⊕; p B; R; 3′ diam; st 14 . . 15 m..................................	478
		16.7	27 43	⊕; v B; R; g v m b M; 3½′; all clearly resolved into stars 14 . . 16 m. A blaze of stars.	619
3748	I. 51?	18 20 25.4	115 35 57	B; S; R; p s b M; diam in R A = 4ˢ.5; barely resolved; a very delicate object; doubtless a ⊕.	474
3749	II. 205 h. 2012	18 21 36.2	113 35 23	⊕; p B; R; g p m b M; 2′; resolved into visible, but v S stars 15 . . . 16 m.	793
3750	....	18 23 22.8	163 24 7	v F; l E; g l b M; 20″..	605
3751	....	18 24 4.6	100 30 43	cl VIII. class; a small well insulated group of a roundish figure, 5′ diam; st 12 . . . 13 m; one ✱ 9 m, at the southern edge.	591
3752	Δ. 607	18 24 31.5	123 6 40	B; p m E in parallel; g m b M; 60″ l, 35″ br; all clearly resolved	476
		32.3	5 47	v B; S; 40″; res. Among close st, which give it an elongated appearance, but do not seem to belong to it.	619
		35.0	6 43	p B; S; l E; 90″ l, 75″ br; stars 15 m..........................	478
		36.9	6 1	v B; p L; E; g m b M; resolved into st rather large for the size of the neb. It is much like an oval cluster nebula, of which there are plenty in the Nubecula Major.	791
		....	6 30	Observed July 16, 1836, in equatorial zone rev; p F; E; 1′ l..........	
3753	M. 22 h. 2015	18 26 4.1	114 2 13	⊕; v B; v L; v m comp; v g v m b M; 7′ diam. The stars are of two magnitudes, viz., 15 . . 16 m, and 12 m; and what is very remarkable, the largest of these latter are visibly reddish; one in particular, the largest of all (= 12.11 m) s f the middle, is decidedly a ruddy ✱, and so I think are all the other large ones.	793
		4.6	2 7	⊕; fine; v rich; v m comp; g m b M, but not to a nucleus; diam in R A = 35ˢ.5; consists of stars of two sizes, 11 and 15, with none intermediate, as if it consisted of 2 layers, or one shell over another. A noble object. [N.B.—*Comparing this place with h 2015, a suspicion of proper motion arises.*]	474
3754	VIII. 12	18 27 27.1	98 21 19	A cl of L st. It is the commencement of the bright milky way, which here comes on suddenly in its main body.	609
3755	....	18 29 13.8	152 26 55	p F; R; p s b M; r; 25″..	480
		14.0	27 16	Not v F; R; p s b M; 15 . . . 20″	481
3756	M. 70 Δ. 614	18 32 5.7	122 26 46	⊕; B; R; g m b M; diam in R A = 7ˢ.0; resolved into st 14 . . . 17 m.	477
		8.3	26 35	⊕; B; R; g b M; resolved into st 15 m	478
		8.8	26 54	Seen, and place taken; no description. [N.B.—This is no doubt M 70, though the P D of that object is stated at 121°, which (all the above observations agreeing) must be the wrong degree.	619
3757	....	18 32 9.9	155 21 25	B; R; p s v m b M; 40″; has a ✱ 6.7 or 7 m, 5′ or 6′ n p	727
		12.8	20 26	v B; R; first v g, then p s m b M; 90″; a ✱ 6.7 m, 7′ s p............	708
3758	....	18 35 53.8	99 33 39	cl VII. class; p rich; irreg R; p well insulated; not much comp M; 10′ diam; st 12 . . . 15; one 9 m taken.	591
3759	....	18 37 32.9	147 29 36	p F; l E in parallel; p s l b M; 40″ l, 30″ br........................	471

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3760	....	18 40 46.2	153 21 38	Neb. No description	708
3761	....	18 41 33.6	144 0 31	F; S; l E; 18″	710
		38.1	1 1	F; l E; v g b M; 80″	789
		....	....	v F; v S; R; g b M; 12″. [This P D was read off = 144° 2′ 38″, but being already 2 fields past the meridian, this will require a large swing correction, which will bring it nearly to the value determined in the other regular observations.]	468
3762	I. 47	18 43 50.9	98 54 10	⊕; p L; F; R, rather irreg; v g l b M; 6′ or more in diam; all resolved. A fine object, the st being very close and numerous.	591
3763	M. 54	18 44 10.7	120 41 5	⊕; B; R; g m b M; diam in R A = 9ˢ; clearly resolved with left eye..	476
	Δ. 624	10.7	39 39	⊕; B; p L; v l E; g b M; $2\frac{1}{2}$′ diam; resolved into st 15 m, with a few outliers 14 m.	477
		11.1	40 54	v v B; R; p s v m b M, to a large nipple; diam $2\frac{1}{2}$′; pos of a ✱ 13 m, almost involved = 147° ±.	619
		....	39 30	Obs in equatorial zone rev, July 16, 1836, on a neb. B; s b M; 90″....	
3764	....	18 44 24.0	156 19 17	v F; R; g l b M; 20″; a ✱ 9 m 5′ dist; pos = 220°	603
		25.2	19 28	e F; g l b M; 20″	612
3765	....	18 44 49.7	158 49 27	v F; L; R; v g v l b M; 60″; R A :: being by an auxiliary ✱	603
		....	48 58	e F; R; 40″; too late for R A; same neb as No. 3, ƒ 603	612
3766	III. 143 h. 2022	18 44 51.9	112 54 24	Close, to the south of, ν^2 Sagittarii; a very small clustering knot, with perhaps nebula. A doubtful object. I see 3 or 4 of the st, but there is also a nebulous appearance.	793
3767	....	18 46 16.8	147 59 1	p F; R; p s b M; 30″; the central brightness comes almost to a nucleus.	471
3768	....	18 47 2.8	155 7 37	p F; S; E; g l b M; 15″; 2 st 8 m precede; the nearest about 8′. Both are nearly on the parallel, or a little south of the neb, by diagram.	708
3769	....	18 48 ..	144 9 48	e F; p L; R. The R A not observed, but the observations immediately preceding and following being 48ᵐ and 53ᵐ, it is probably between those limits.	468
3770	Δ. 573	18 48 4.1	126 51 0	⊕; B; L; R or v l E; v g b M; diam 5′; perfectly resolved into st 14..16 m, with stragglers extending to 8′ diam.	485
3771	....	18 49 17.8	159 9 8	v F; S; R; p m b M; 10″ diam; s p a ✱ 7.8 m; a great many st 12 and 13 m in field.	614
3772	....	18 50 28.4	152 26 1	e e F; v g l b M; 20″; a very difficult object	481
3773	....	18 50 31.1	155 42 5	v F; R; g l b M; 20″; the preceding of 2	708
3774	....	18 50 46.6	155 40 35	e F; R; g l b M; 25″; the following of 2	708
3775	....	18 52 22.4	151 36 39	p F; v S; E; p s b M; 12″ l; has 3 stars preceding	480
		24.3	37 6	F; v S; l E; follows 2 st 14 m	481
3776	Δ. 262	18 53 34.5	154 6 22	p B; R; at first v g, then s v m b M; total diam 2′, but that of the B part = 15″.	600
		35.2	6 37	B; R; g p m b M; 60″; r	708
3777	....	18 54 46.2	152 13 10	e F; R; g l b M; 30″	726
3778	Δ. 295	18 55 44.0	150 14 6	⊕; B; R; p rich; p s m b M; 5′; stars of 2 sizes, viz., 11.12 and 15..16; s p is an elegant first class D star.	726
		48.6	14 16	⊕; B; rich; p s m b M; 7′. The stars are of 2 magnitudes, the larger 11 m, run out in lines like crooked radii. The smaller, 16 m, are massed together in and round the middle.	480
		49.5	15 16	⊕; B; L; R rather irreg; rich; st 11....16 m; comes up to a blaze in the middle; semid in R A = 25ˢ; fine; one star 7.8 m is s p out of the cluster.	471
		49.6	14 21	⊕. The central mass consists of smaller stars than the outside	481
		49.9	14 13	⊕; B; irreg R; p s v m b M; all resolved; st 11....15 m; diam 5′; has a ✱ 7 m 4′ s. and 14ˢ prec.	716
3779	....	18 57 4.9	147 18 9	p B; R; g b M; 80″	712
3780	....	18 58 13.1	140 55 1	p B; p m E in pos 63°; v g l b M; 60″	789
		14.8	53 27	e F; p m E in parallel; g l b M; 90″ l [sic in MS.]	468
3781	....	18 59 45.5	146 35 10	p B; R; 20″	710
3782	....	19 1 53.3	140 55 9	e F; R; p L; 50″	468
		56.4	56 56	v F; irr R; 40″	789

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3783	....	19 4 13.3	150 47 14	v F; R; l b M; 20″. The 1st of 3	726
3784	....	19 4 25.8	150 47 44	e F; 15″. The 2nd of 3	726
3785	....	19 4 26.8	150 49 24	e F; 20″. The 3rd of 3	726
3786	....	19 4 45.6	130 28 41	v F; S; R; p s l b M	479
3787	....	19 7 32.2	154 11 30	p B; R; p s b M; 15″	600
3788	....	19 8 49.0	146 4 54	v F; L; R; v g l b M; 90″	710
3789	....	19 8 59.0	150 13 41	v F; R; p s l b M; 40″	726
		61.3	14 16	Not v F, or p B; R; p s m b M; 30″	471
		61.9	13 41	v F; R; l b M; 20″; has a ∗ 9 m 2′ south	480
3790	....	19 9 47.5	155 55 38	e e F; S; has one or 2 st 9 m, 5′ or 6′ dist	612
		55.4	56 47	e e F; p L; among small stars	603
		....	58 18 :	Viewed; e e F; but it is a nebula. [No R A observed, and the P D not to be put in competition with those of regular observations.]	610
3791	....	19 12 2.5	145 17 2	p F; m E; p s l b M; has a ∗ near s p end. [N.B.—By obs the minute of R A is 13; but as another obs makes it 12, the earlier minute is preferred.]	710
		5.7	16 44	p B; p m E; S; follows a ∗ 11 m	469
3792	....	19 16 21.0	129 13 10	e F; R; v g v l b M; 40″	483
3793	....	19 18 18.1	146 15 19	e F; v S; l b M; makes a lozenge with 3 v S st near it	710
		20.3	15 4	e F; S; R; within [partly within] a small triangle formed by 3 st 11, 13, and 14 m.	469
3794	....	19 25 10.5	161 1 14	p B; p m E; g b to one end (or by diagram a double neb). A star 8 m follows on the parallel.	614
		11.9	1 25	Not v F; l E; g b M; 25″	604
3795	....	19 25 12.6	132 40 6	e F; v S; appended to a ∗ 14 m	489
3796	....	19 25 16.0	128 55 20	e F; R; v g b M	483
		....	....	Well looked for, but only a small star-group found. N.B.—Sky murky..	485
3797	....	19 29 9.5	149 2 36	R; v g b M; 30″; haze thickening rapidly	471
		9.9	2 51	B; m E, in position 169°.2; p s b M; 90″	470
3798	M. 55 Δ. 620	19 29 12.3	121 21 6	⊕; p B; v L; R; v g l b M; diam in R A 30^s.0; all resolved into separate st 13 . . . 16 m; not so comp M as to run together into a blaze or nipple.	478
		14.5	18 15	⊕; a fine L, R, cluster; 6′ diam; all clearly resolved into st 11, 12, 13 m; does not come up to a nipple.	618
3799	....	19 31 41.5	145 44 22	p B; p m E; g l b M; 40″ l, 30″ br	469
3800	....	19 33 23.7	118 56 47	e F; R; v l b M; 40″; a ∗ 9 m north of it, at 6′ distance has what may be easily taken for a nebula attached to it, but it is only a little group of v S st.	475
3801	....	19 46 52.7	155 41 27	e F; R; v S; p s b M; has ∗ 11 m 90″ n p, and one 8 m 6′ dist, s f....	602
3802	....	19 47 3.4	122 16 9	p F; R; p s b M; 15″; on a highly stippled or dotted ground	495
3803	....	19 48 38.9	137 32 12	e F; l E; g l b M; 30″	467
		....	....	v F; R; b M; 15″; found and viewed by the place of ∫ 467	729
3804	....	19 49 6.2	146 33 14	F; L; R; v g l b M; 90″; forms a triangle with 2 st 11 and 12 m, following it.	469
		9.4	32 54	p F; p L; R; v g l b M; 80″	710
3805	....	19 49 45.7	130 40 12	p B; S; R; has a v S star n p	488
3806	....	19 50 4.8	145 18 35	v F; R; b M; 25″	710
3807	....	19 51 7.3	138 43 59	p F; S; R or v l E; p s b M; 15″	729
3808	....	19 52 17.5	144 50 29	v F; S; R; g l b M; 12″	469
		20.8	50 46	F; S; R, or l E; b M	716
3809	....	19 53 6.2	146 51 56	Not v F; S; R	470
3810	....	19 54 4.8	151 34 28	F; R; g b M; 40″	726
3811	Δ. 425	19 54 50.7	138 50 40	B; S; l E; p g m b M; 20″	467
		55.4	51 26	B; S; E; g p m b M; 25″. If a misprint of 42° 12′ instead of 41° 12′ be presumed in Mr. Dunlop's catalogue, this object is identified with his No. 425.	729

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3812	....	19 55 14.4	146 52 17	v F; l E; g l b M; 20″	469
3813	....	19 57 9.7	145 16 8	e e F; L; p m E	710
3814	....	19 57 27.4	138 51 31	v B; S; R; p g m b M; 20″	467
		30.5	51 28	v B; R; g v m b M; 30″	729
3815	....	19 57 45.0	138 46 16	F; p m E in parallel; g b M; 30″ l	467
		47.4	46 34	p F; l E; 25″	729
3816	....	19 58 48.5	161 17 10	F; R; g l b M; 30″; has a v S ✻ preceding; first of 4	604
		51.7	16 54	F; E; 40″ l; has a ✻ 9 m 10ˢ.5 preceding. The minute of R A altered from 59 to 58, as both the context of the MS. and the obs of *f* 604 agree in requiring.	614
3817	....	20 0 13.7	161 22 15	p F; R; 20″; a v S almost invisible ✻ s f; 2nd of 4	614
		15.7	22 25	p B; S; R; r; 15″	604
3818	....	20 0 31.2	161 22 50	e F; e S; the 3d of a group of 4	604
		32.2	22 0	v F; v S; R	614
3819	....	20 1 6.7	136 39 33	F; v S; R; v g m b M; 10″; a ✻ 7 m s f dist 5′	463
3820	....	20 1 24.9	161 22 25	p F; S; R; r; 15″; the last of 4	604
		31.1	22 16	e F; v S; has a v S ✻ close to it	614
3821	....	20 1 56.5	135 1 45	v F; L; R; g l b M; 90″	472
3822	....	20 4 20.1	143 17 52	p F; L; p m E; g l b M; 2′ l, 1′ br	615
3823	....	20 5 46.2	144 28 23	v F; L; l E; 2′ l, 90″ br	710
3824	....	20 6 22.7	135 19 4	F; R; v g l b M; 15″	463
		24.2	19 25	p B; S; R; g b M; 25″	472
3825	....	20 8 31.7	138 46 21	p F; R; s v m b M to a ✻ 12 m; 20″	467
		34.4	46 22	p F; R; g b M; 20″	729
3826	....	20 11 51.0	140 57 36	F; R; S; g l b M; 15″ among stars	615
3827	....	20 12 48.4	134 11 29	F; R; p s b M; 25″	728
3828	....	20 15 35.6	137 34 41	p B; p L; g b M; near 2 st 10 m	463
3829	....	20 17 52.8	170 34 48	p B; R; p s m b M; 25″	611
3830	....	20 18 42.1	138 2 22	v F; attached to a ✻ 12 m s f. [N.B.—By a diagram made at the time the star is s p.]	463
3831	....	20 19 55.8	134 46 48	e F; p L; R; v g v l b M; 40″	728
3832	....	20 21 8.1	121 23 22	p B; R; g b M; has 2 or 3 st very near it	619
		8.7	23 21	F; R; g b M; 25″; between 2 stars	620
		11.5	23 30	F; S; l E; b M; 15″ l, 12″ br	476
		12.7	24 0	p B; R; p g b M; 25″	618
3833	....	20 23 5.2	164 12 54	F; S; R; g l b M; follows a hook of 5 stars	606
3834	....	20 23 42.3	122 33 0	B; m E; p s l b M; 2½′ l, 40″ br	476
		43.1	32 26	p B; p m E; p s b M; 80″ l, 20″ br	477
		43.7	33 23	B; L; m E, in position 6°.0; p s m b M; 3′ l	620
3835	....	20 25 43.4	142 40 51	p F; L; R; g l b M; 2′; the preceding of 2	468
		48.1	41 41	B; p L; R; g b M; r; 80″	615
3836	....	20 26 8.9	142 44 46	v F; R; 40″	468
		13.7	43 51	F; R; g l b M; 30″	615
3837	....	20 27 46.8	144 53 54	p B; R; p s l b M; 60″	710
3838	....	20 28 8.9	159 20 30	p F; L; m E; v g b M; 3½′ l; 1½′ br; has a barely perceptible point in the middle.	604
3839	....	20 30 38.1	123 5 10	v F; L; R; g b M; on a faintly stippled ground	495
3840	....	20 30 48.3	143 57 35	e F; p L; l E; 60″ l; 50″ br	710
		51.1	57 44	v F; E; l b M; 35″ l	615
3841	....	20 37 42.7	128 36 55	B; R; p g m b M; 25″; follows 4 st; of which 1 is 9 m	483
3842	....	20 40 7.8	139 24 16	p B; S; l E; g m b M; 18″ l	497
3843	....	20 44 56.7	142 30 46	e F; S; R; the preceding of 2	468
		58.1	31 25	v F; p m E	498

No.	Synon.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3844	....	20 45 17.6	134 37 14	e F; S; R; 45″	728
3845	....	20 45 36.1	142 30 56	F; L; l E; g l b M; 90″ l; the following of 2	468
		37.6	30 55	v F; p L; l E; v g b M	498
		38.6	31 3	F; R; g l b M; 20″	615
3846	....	20 46 12.0	139 17 15	F; S; R; g p m b M; has a v B * 1′ prec	497
		17.3	16 45	p B; S; l E; g b M; among B stars	496
3847	....	20 47 11.0	146 13 44	A * 10 m, to which is attached or almost so, by its extremity an e F, v s nebulous ray; v m E in merid 15″ l; 4″ br; night superb, and without this condition it were useless to look for this object.	469
		12.0	12 43	e e F; v S; R; S of a small * 13 m, 10″ dist	710
3848	....	20 51 49.4	139 42 15	p F; p L; R; g l b M	497
		52.8	41 40	F; S; R; s m b M; 15″	496
3849	....	20 52 7.8	139 47 25	e F; R; l b M; has a * 11 m 60″ foll on parallel	497
3850	....	20 53 11.1	143 13 5	p B; v S; R; p s l b M; 12″	468
		13.4	13 20	p B; S; R; p s m b M; 15″	615
		13.5	12 44	p B; S; R; p s b M; 15″; among stars	498
3851	....	20 55 18.2	135 29 4	A nebulous looking but doubtful object following a * 10 m. My eye is too much fatigued to be able to decide on its nature.	463
		22.0	29 25	F; E; v g v l b M; 60″ l; 30″ br; near a *	490
3852	....	20 56 15.1	137 51 49	p F; S; R; b M; has 2 st 12 m north	497
3853	....	20 57 4.4	154 42 53	p B; l E; p g b M; 30″ l	727
3854	....	20 57 9.2	154 12 42	p F; R; p s b M; 25″; has a * 7.8 m 10′ prec, exactly in the parallel..	602
3855	....	20 57 39.8	139 59 18	e e F; S; R; on a delicately and uniformly stippled ground; a bright triple * 6′ or 7′ s f nearly points to it.	497
3856	....	21 0 2.1	139 58 38	B; R; g p m b M; 35″	497
3857	....	21 0 3.4	158 59 12	v F; R; g l b M; 25″	610
3858	....	21 3 36.1	137 54 53	F; p L; R; g l b M; 90″	497
		37.6	55 15	B; L; p m E; g b M; 2′ l; 90″ br	496
3859	....	21 4 51.5	139 4 8	B; S; E; has a * 10 m 3′ n f	497
		53.5	3 57	B; p m E; p s m b M; 40″ l; has a * 11 m s f	467
3860	Δ. 406	21 7 20.6	139 16 12	B; R; p g m b M; 60″	497
		25.8	16 25	v B; p S; p m E; p s v m b M; 25″ l, 15″ br	496
3861	....	21 14 1.6	133 11 18	e F; v S; R; the preceding of 2	728
3862	....	21 14 23.4	150 44 55	B; l E; g p m b M; 90″ l, 40″ br	613
3863	....	21 14 57.1	133 8 4	v F; S; R; the following of 2	728
3864	....	21 15 56.3	139 47 50	e e F; v S; R; 10″; the feeblest object imaginable	496
3865	....	21 17 2.4	143 30 59	e F; v m E, in pos = 90°.8; v g b M; 80″ l; has a * s	468
3866	....	21 19 29.4	133 49 46	F; L; v l E; v g l b M; 2′ br; the preceding of 2	489
		30.7	49 26	F; p L; l E; g v l b M; 60″	728
3867	....	21 19 40.7	133 54 0	v F; just seen; R A deduced roughly from that of the preceding nebula ..	728
		41.4	53 26	F; S; R; v g l b M; 30″; the following of 2	489
3868	....	21 20 56.7	129 21 27	p F; S; R; p s b M; 15″	488
		....	22 10	v F; v S; R; 15″. Too late for R A	718
3869	....	21 21 35.0	134 48 44	B; R; p s b M; 30″	490
3870	Δ. 263	21 22 11.0	154 39 0	p B; p L; R; g b M; 60″	727
		13.9	39 7	F; L; R or l E; v g p m b M; 60″; r; with long attention it appears mottled. Perhaps Δ 263, with 3m correction in R A.	602
3871	....	21 23 50.1	131 34 28	p F; S; R; g b M; 15″	488
		50.2	34 22	v F; R; 20″	718
3872	....	21 24 28.8	145 18 40	p B; L; v m E in pos 127°.1; first g, then p s l b M to a v feeble nucleus; 4′ l, 40″ br; has a * 11 m preceding.	499

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3873	....	21 25 ..	127 32 ..	e F; p L; v g b M; 2′; place considerably uncertain, having been found when much past the meridian in searching in vain for Δ 561. This neb is much too faint to have been seen with 9 inches aperture [*to say nothing of the difference of place, for mine cannot be so much in error as would reconcile them*]. It precedes a ✻ 6 m nearly in the parallel, about 40 seconds of time.	486
3874	....	21 27 57.4	154 40 3	v F; S; R; 12″; has a v S double ✻ n f, near	727
3875	....	21 27 57.4	172 18 14	F; p L; R; v g v l b M; 50″	795
		80.8	17 36	F; p L; v g l b M; has a ✻ 13 m on it............................	796
3876	....	21 28 54.1	165 52 29	p F; R; first v g, then p s b M; in a field with many large stars, and strongly stippled.	627
3877	....	21 29 27.4	133 17 56	B; S; R; p s m b M; 15″; (fog)	489
		31.6:	18 46	B; l E; g p m b M. [R A obtained by calculating from Δ P D and observed position, with a star near it, and therefore not to be considered as exact.]	728
3878	M. 30 h. 2128	21 30 45.5	113 56 38	⊕; B; l E; b M; 4′ l, 3′ br; all resolved into st 16 m, besides a few 12 m. Two lines of rather larger stars run out n f.	474
3879	....	21 30 55.7	143 28 34	e F; l E; v g l b M; 30″; makes an obtuse angled triangle, with 2 st 9 and 10 m to n.	468
3880	....	21 31 26.0	135 33 42	v F; p L; R; v g l b M; 2′ diam	490
3881	....	21 31 42.8	125 13 1	e F; v S; among stars	493
3882	....	21 31 59.8	124 56 4	v F; S; R; b M...	492
		....	56 36	p F; too late for transit	493
3883	....	21 34 33.2	139 12 28	v F; R; S; g l b M; the preceding of 2	497
		33.7	11 50	p F; R; g b M; 15″	496
3884	....	21 34 57.2	139 7 58	p F; S; R; g l b M; the following of 2...........................	497
		59.4	8 0	v F; R; g b M; 15″	496
3885	....	21 35 13.7	137 17 49	Not v F; S; R; g b M; 20″	490
3886	....	21 36 1.5	161 6 57	p B; R; v g b M; 20″; a star 9 m follows, 8′ dist	616
3887	....	21 36 42.0	151 29 32	e F; p L; R; 60″; the preceding of 2	613
3888	....	21 36 42.6	141 21 14	e F; l E; g l b M; 70″ l, 60″ br	468
		44.4	20 32	B; L; p m E; v g b M; 2′ l, 80″ br	498
		46.2	21 22	v F; p m E; v g l b M. (N.B.—Mirror begins to show signs of a want of light.)	730
3889	....	21 36 45.0	151 23 27	p B; p L; l E; g b M; 40″ l, 35 br; the following of 2..............	613
3890	....	21 38 3.4	125 13 58	p B; R; g l b M; 20″	493
3891	....	21 39 33.3	125 40 11	p B; R; b M; 20″; a ✻ 14 m precedes just out of neb	492
		34.2	39 48	p B; L; v g b M; has 5 st 8 m in field surrounding it	493
3892	....	21 40 21.7	147 20 25	p F; R; g b M; 35″	499
3893	....	21 40 24.8	146 21 53	F; L; R; first g, then p s l b M. [N.B.—*It is not improbable that this and the nebula immediately preceding ʃ 499 are identical, one or other being mistaken 1° in P D. Still, as both observations are clearly written in MS., and, as the difference of P D even then is rather considerable,* (1′ 28″) *I have thought it necessary to enter them separately.*]	500
3894	....	21 41 34.7	139 2 47	B; R; g m b M; 39″...	497
		38.2	2 50	v B; p L; R; s m b m to nucleus; 45″	496
3895	....	21 42 16.0	138 40 47	B; R; p g b M; 20″; within a triangle of 3 st 13 m	497
3896	....	21 43 43.5	141 28 24	e F; m E; v g b M; rather wedge-formed; ? if not binuclear	468
		47.7	27 37	F; l E; v g l b M; 40″	730
		49.3:	26 45	F; p L; l E; v g b M; r	498
3897	....	21 44 5.2	120 5 0	e e F; v S; 10″; barely perceptible; sky perfectly clear................	620
3898	....	21 44 45.4	119 49 54	e F; S; E; or has an e F ✻ near	495
3899	....	21 44 59.1	140 19 16	p B; S; R; g b M; 15″	497
		62.9	19 15	p B; S; l E; p s m b M; 20″	496
3900	....	21 45 9.5	125 37 12	B; p L; g l b M; more nebulæ hereabouts	492
		12.6	36 20	B; p L; irreg R; g l b M; r; 60″	493

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3901	....	21 49 5.5	134 6 59	F; L; m E; v g b M; (Fog)	489
		....	....	Viewed; p F; p L; l E; g l b M; 50″; readily found in place by ʃ 489, but place not re-taken.	728
3902	....	21 49 21.9	122 41 43	p F; l E; g l b M; 40″	494
		23.6	41 52	v F; p L; R; g b M; 40″	620
		29.1	41 23	v F; p L; l E; v g b M; 50″ l, 40″ br	619
3903	....	21 50 1.1	134 12 4	p B; S; R; p s m b M; 15″	489
		....	....	Viewed; readily found by place of ʃ 489; B; l E; v s v m b M to nucleus	
3904	....	21 50 53.8	142 34 1	p F; S; R; p s l b M; 15″......................................	468
		54.4	33 7	p B; S; R; p s b M; 20″	498
		56.7	33 42	p B; R; p s b M; 20″	730
3905	....	21 50 55.2	115 26 51	F; R; v g l b M; 45″; has a ✱ 10 m, 90″ dist from centre, following in parallel.	474
3906	....	21 51 11.2	138 30 20	e F; S; R; difficult to distinguish from a ✱ 15 m; has a ✱ 8 m, dist 4′ n p nearly in parallel, and another 11 m, 60″ n f.	496
3907	....	21 52 2.9	154 51 47	F; R or l E; v g b M; 40″	602
		8.3	51 52	p F; l E; g b M; 25″ long	727
3908	....	21 52 4.8	122 40 13	p B; p L; g b M. [*The first of a group of* 4.] *See fig.* 11, *Pl. IV.* ..	494
		5.1	41 21	p B; E	493
		8.8	42 24	p B; R; 40″	492
		9.1	40 54	F; p L; l E; g b M	619
3909	....	21 52 6.6	122 46 51	B; v S; R; s b M to a ✱. [*The 2nd of* 4.].........................	493
		6.8	46 53	B; S; R; s b M...	494
		7.4	47 18	p F; R	620
		10.1	45 49	p B; S	619
3910	....	21 52 9.2	122 49 4	In ʃ 493 this was taken for a v F star, but I now perceive it plainly to be a small faint round nebula. [*Place deduced from that of the larger neb, to which it is attached* (*No.* 4 *of the group*), *by a careful measurement of the diagram made at the time, taking for the unit of measure the line joining the centres of the 2nd and 4th neb.*]	495
		10.4	48 3	p F; S; attached to a larger, following it. [*The 3rd of* 4.]...........	620
3911	....	21 52 11.6	122 47 41	v B; p L; s b M to a star; has a very faint star s p. [*The last of a group of* 4.]	493
		12.6	48 34	B; R; m E, or rather distinctly binuclear, or a double nebula. Pos of the smaller about 250°. Much brighter and better seen than last night. Not a doubt about the nature of the appendage.	495
		12.9	48 8	B; p S; R; double..	620
		13.6	46 49	B; R; g p m b M; 40″...	619
		15.0	49 0	B; p L; R; s m b M; place roughly derived from that of the 2nd of the group as observed.	494
		15.8	48 24	B; R; p g b M; 40″. [See fig. 11, Pl. IV. for this group.]	492
3912	....	21 52 18.8	126 37 20	e F; S; R; 2′ n of a ✱ 8 m; a double star 10 = 10 m follows nearly on the parallel of the neb, and pointing directly to it. A sure observation; but except in the finest nights this neb will not be seen.	485
3913	....	21 54 4.1	155 27 47	v F; S; l E; v g b M; 20″.......................................	602
3914	....	21 54 8.6	155 7 52	p B; S; R; g p m b M; 20″	602
		9.5	8 12	p B; S; R; p s b M; 20″	727
3915	....	21 54 51.9	140 56 37	B; R; g m b M; 20″; has a ✱ 12 m 60″ foll	497
		52.9	56 43	p B; R; p s l b M; 20″; position of a ✱ 14 m from neb = 101°.7	468
		55.9	56 32	p B; R; 25″; among small stars	730
		57.5:	56 33	v B; S; R; s m b M; 15″; among many stars. The R Ascensions of this ʃ uncertain to 4 or 5 seconds, owing to unexplained fluctuations of the zeros.	498
3916	....	21 55 47.5	155 31 27	v F; v S; R; p s l b M; follows a ✱ 11 m, 3′........................	602
		49.3	31 53	v F; S; R; ☽, but a good observation...............................	727
3917	....	21 56 11.2	140 49 30	p F; S; R; s m b M; 15″	496

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3918	....	21 56 40.3	122 4 0	p F; R; g b M. P D roughly deduced from No. 15 of this *f*	494
		41.0	4 25	v F; a large star follows	620
		45.9	4 9	v F. [*This is the first of a group of* 3, *No.* 2 *of which, however, is so faint as to have escaped obs in sweeps* 494 *and* 620.]	619
3919	....	21 56 49.5	148 15 11	p B; l E: g l b M; 2½′ l, 1½′ br	470
		....	....	Found in place; p B; L; E; first g, then p s l b M; 3′ l, 2′ br	735
3920	....	21 56 57.0	122 0 30	e F; S; star like; *the* 2*nd of a group of* 3. [N.B.—*It precedes the* 3*rd* 2 *beats of the chronom* = 1ˢ.0. *The R A here set down, it must be noticed, is comparable only with that single value of the R A of the others, which results from f* 619.]	619
3921	....	21 56 54.3	121 58 23	p F; R; g b M. [*The last of a group of* 3.]	494
		54.5	59 16	p F; the following nebula; a large star follows	620
		58.0	57 30	F; R; g b M; the 3rd of 3; follows the 2nd 1ˢ.0	619
3922	....	21 57 3.3	121 52 13	p B; L; l E; g b M; 80″. [*As this nebula might be seen in the same field with all those of the group of* 3 *observed in sweeps* 494, 619, 620, *it properly belongs to that group of which it forms the* 4*th and last.*]	494
3923	....	21 57 41.1	119 52 39	v F; v S; R; almost uniformly bright	495
3924	....	21 58 35.1	137 59 20	v B; R; g b M; 45″	496
3925	....	21 59 7.0	159 29 32	p F; R; g b M; 25″	616
3926	....	21 59 25.5	118 38 27	A v S cluster or resolvable nebula; irreg R; l b M; 2′ diam; has 2 or 3 st larger than the rest.	475
3927	....	22 0 31.2	155 40 42	p B; R; p s b M; near 2 stars	602
		34.2	41 4	e F; S; ☽ ☽	727
3928	....	22 1 27.6	121 22 53	F; R; g b M; has 2 st 14 m near, one almost involved	494
		29.2	23 34	v F; S; R; 2 v S st near	495
		29.5	23 22	F; R; g b M	620
		33.5	22 45	p F; l E; g b M; either r, or has loose stars	619
3929	....	22 3 33.6	116 59 27	p F; S; l E; b M; 15″ l, 12″ br	475
3930	....	22 4 19.1	120 12 59	F; p L; R; g b M; 80″	620
		21.4	13 13	p F; L; R; g l b M; r	494
		22.9	12 6	v F; l E; g l b M; 50 or 60″ l	619
		23.7	13 19	e F; p L; R; v g l b M; 50″	495
3931	....	22 5 5.5	136 41 23	p B; v S; p m E; p s b M; 15″ l, 8″ br. The preceding of 2	490
3932	....	22 5 16.0	136 41 8	F; v S; R; 10″. The following of 2. A star 8 m follows nearly on the parallel, and another to the north.	490
3933	....	22 9 27.3	145 57 50	e e F; R; rather a doubtful object	499
3934	III. 458	22 11 17.0	115 31 43	Not v F; S; R; b M; 30″	474
3935	....	22 13 24.6	119 12 27	v F; S; R or E, as if it had a feeble neb s p; g l b M; 15″	475
3936	....	22 13 27.9	119 48 15	e F; p L; R; v g l b M; 40″	495
3937	....	22 13 42.5	123 12 33	e F; S; R; l b M	494
3938	....	22 14 36.9	124 32 58	B; l E; g b M; 50″; has a bright triple ✻ s p	493
		37.2	33 9	p B; R; p g b M; 40″; a large triple ✻ s p	492
3939	....	22 15 58.7	122 3 26	v F; S; R. [*The preceding of* 2.]	494
		60.5	2 26	p F; S; l E	620
		64.6	2 33	v F; irreg R, or l E; 40 or 50″	619
		....	3 ±	F; R; g l b M. Rough place	494
3940	....	22 16 30.9	122 0 13	p F; p L; l E; g l b M. [*The following of* 2.]	494
		31.9	0 36	v F; S; R	495
		32.0	0 ..	p F; S; R	620
		36.3	0 34	v F; l E; 30″	619
3941	....	22 16 55.0	151 2 0	e e F; l E; v g v l b M; very difficult, but a certain observation. It is n p the first of 3 stars 10.11 m.	726
3942	....	22 17 21.2	126 0 34	v F; p L; R; v g v l b M; 30″	492
		25.1	0 15	v F; S; R; g b M; 15″	486

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3943	II. 469	22 19 10.5	115 43 27	p B; irr R; 25″; involves a double * (13 m + 14 m)	621
		10.7	43 29	F; E; b M; r; binuclear, pos 62°.3. Rather an equivocal object, whether nebulous or a group, but I incline to regard it as a nebula.	474
3944	....	22 19 27.8	126 19 29	v F; R; g l b M; 20″	493
3945	....	22 21 14.3	128 42 10	e F; S; R. *The preceding of* 2	486
		25.8 :	38 52 :	e e F; perceived with the utmost difficulty, and taken at leaving the field. [Place very uncertain.]	637
3946	....	22 21 38.8	128 41 20	e F; S; R. *The following of* 2	486
		46±	37 ±	Required very long attention to see (mirror growing dim). [Place very rude, by estimations from the preceding nebula, which is itself ill determined in this *f*.]	637
3947	....	22 23 46.4	131 49 6	F; p L; p m E; about pos of 75° with parallel; 2½′ long	737
3948	....	22 23 47.9	118 7 17	v F; S; l E; follows a * 11 m in the parallel	475
3949	....	22 26 22.4	116 55 10	p B; L; m E in merid; v l b M; 4′ l, 2′ br; ☽	474
		22.4	54 47	B; v L; m E in merid; g v l b M; 4′ l, 1½ br	475
		....	55 32	B; L; m E in merid; 3′ l, 1′ br; cloud prevented transit being observed..	621
3950	....	22 28 0.2	128 6 0	p F; R; g b M; 20″	484
		4.2	7 0	e F; S; v l E	486
		6.5	5 7	e e F; barely, but certainly seen. [N.B.—*The obs makes the R A* 29ᵐ 6ˢ.5, *and as the P D fails of a perfect agreement, it is not impossible that this may be a different nebula.*]	637
3951	....	22 28 29.5	157 21 34	p B; m E in parallel; g b M; 50″ l, 20″ br	610
3952	....	22 33 42.8	128 45 50	e e F; v S; R; a double star follows about 40ˢ on the parallel	486
3953	Δ. 255 ?	22 34 6.1	156 0 43	F; S; R; b M; 15″	610
3954	....	22 34 50.3	120 56 27	F; p L; v m E in merid; v g v l b M	495
3955	....	22 35 46.2	130 14 0	F; l E; g l b M; 30″ l	737
3956	....	22 40 40.8	127 44 45	e F; v S; R; appended (s f 45°, dist 30″) to a * 12 m; place taken that of the star.	486
3957	....	22 43 57.0	136 15 8	p F; l E; g l b M. Query if it have not a v S * involved	490
3958	....	22 44 41.3	130 13 2	v F; S; R; 15″. [The minute altered from 45 to 44 of R A, as required by the context of the observations.]	737
3959	....	22 44 52.0	154 36 2	p B; R; v g l b M; 40″	507
3960	Δ. 518	22 45 19.3	130 34 17	A long p B ray, 4′ long, p s v m b M; elongated in pos 44°.7	737
		21.1	33 59	B; p L; v m E in pos 41°.9; p g m b M; 3′ l, 20″ br; has a * 11 m, 2′ dist, pos from nucleus 12°.9.	488
3961	....	22 46 2.0	133 33 22	e F; v L; 3′ diam at least; it is s p a * 7 m, 8′ dist	728
3962	....	22 46 38.8	155 55 57	p F; R; g p m b M; 20″	731
		44.0	56 0	B; R; g p m b M; r; 40″	610
3963	....	22 46 57.3	127 56 10	p B; v L; R; or v l E; v g b M; 4′ diam; with left eye r, hardly resolved P D bad. A fine object.	484
		62.2	56 40	B; v L; R; or v l E; v g l b M; 5′	486
		63.3	55 2	v F; v L; R; v g l b M; 3′	637
3964	....	22 47 17.9	128 16 15	B; L; R; g p m b M; 2′; r with right eye; with left, barely resolved in the centre.	484
		19.2	15 10	B; L; R; g b M; 2½′ or 3′	486
		23.9	13 55	p F; p L; v l E; v g l b M; 50″ l	636
		....	15 2	v F; (mirror dim)	637
3965	....	22 47 38.1	131 58 53	v F; l E; 45″	728
		39.1	58 26	F; v L; R; v g m b M; 3′ diam	489
3966	....	22 52 32.0	130 58 57	F; L; m E; v g l b M; pos of elongation 33°.8; 4′ l; 1′ br; loses itself imperceptibly.	488
3967	....	22 52 35.0	130 29 23	e F; v L; v l b M; 6′ l; 3′ br	737
3968	....	22 53 12.9	131 44 19	v F; v m E, in pos 5° ±; 100″ l	728
		14.8	44 53	p B; S; v m E; has a * 11 m preceding its extremity	489
3969	....	22 54 27.9	141 1 50	e F; R; g l b M; 60″; has a * 11 m n p 3′ dist	496

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3970	....	22 55 36.3	134 0 59	p F; S; R; 12″; makes an obtuse-angled triangle, with 2 st 7 m at some distance.	489
		38.4	1 44	e F; R; 20″; makes a triangle with 2 st 7 m	728
3971	....	22 56 35.4	127 11 44	p B; S; R; g b M; attached to, or not much separated from, a ∗ 8 m just S of neb, 60″ dist. [N.B.—*The description of this neb and the next agree so well that it seems highly probable they are the same, this being* 1m *too early in R A. Nevertheless, on that supposition, there is still a rather unusual discordance of places, and as the minute is quite distinctly written in the original observations, I have preferred leaving the question of identity open.*]	484
3972	....	22 57 41.2	127 11 50	Not v F; S; R; appended to, and very nearly n of, a ∗ 9 m, the preceding of 2 st, neb 90″ from ∗.	486
		44.1	10 7	F; R; g l b M; pos 2°.1 from a ∗ 10 m 30″ dist	637
		44.6	11 35	F; S; R; just n of a ∗ 9 m	636
3973	....	23 0 14.6	134 19 55	F; p L; l E; g l b M; near 2 st	728
		15.2	20 40	B; L; l E; v g m b M, to a ∗ 13 m	489
3974	II. 2 ? h. 2211	23 2 56.2	118 27 8	B; R; p s v m b M; 60″. [*The degree* (118) *of P D is distinctly written and rightly reduced. Still, supposing* 119 *to be the correct reading, the place agrees so well with* II. 2, *that it is very likely that nebula with a mistaken degree.*]	742
3975	....	23 5 19.9	134 31 36	p B; S; l E; p g m b M...	728
3976	....	23 6 9.7	129 27 22	p F; S; R; or l E; v g v l b M; attached to a ∗ 10 m in parallel......	488
		....	28 ±	e e F; close to a ∗	737
3977	Δ. 475	23 6 44.8	133 31 17	B; S; m E, nearly in the parallel; v s b M to a ∗ 13 m	728
3978	Δ. 476 ?	23 8 59.8	133 2 47	p B; L; p m E; g b M...	728
3979	II. 236 h. 2226	23 9 14.1	95 34 56	p B; R; g b M; 20″	739
3980	Δ. 477	23 9 29.5	133 9 42	p B; p m E; g b M; 90″; the preceding of 2	728
3981	Δ. 477	23 9 57.0	133 10 57	F; p m E; g b M; 3′; [the following of 2]..........................	728
3982	I. 104 h. 2228	23 10 16.2	99 25 24	F; p L; p m E; 2′ l; 1½′ br......................................	740
3983	....	23 11 33.6	153 3 22	e F; e S; rather a doubtful object; situated among 5 small stars	507
3984	....	23 12 36.4	172 50 10	v F; p L; R; v l b M; 90″; 2 or 3 st near it.......................	633
3985	....	23 12 39.7	133 24 34	p B; S; R; p s b M; 20″	489
		44.5	24 53	v F; R; g l b M; 20″..	728
3986	....	23 12 38.2	158 36 2	p F; v S; p m E in parallel; p s b M	508
		39.9	35 18	v F; R; or l E; g b M; 15″..	731
3987	....	23 13 27.0	120 12 32	e F; S; R; s b M; rather a doubtful object	495
3988	....	23 14 31.0	120 18 43	v F; S; R; g l b M; 15″	494
3989	....	23 15 33.3	148 43 30	F; R; g b M; 35″	735
		34.4	43 51	p B; R; g l b M; 40″; the preceding of 2	504
3990	....	23 15 54.0	148 49 51	e F; S; R; the following and fainter of 2	504
3991	....	23 16 24.4	158 57 32	e F, and feeble, if a neb; p s l b M; v S; R; 10″. It follows a large ∗. Re-examined—it is a nebula.	616
		32.5	58 0	e F; R; S; 15″ follows a star 10 m on parallel 22s.5	731
3992	....	23 16 57.0	148 44 50	e F; R	735
3993	....	23 17 8.7	156 12 42	e F; L; R; v g v l b M; 100″; a difficult object	507
3994	....	23 17 10.0	130 9 36	Double nebula; individuals equal; e F; R; b M; 20″; follows a line of 4 st 11 and 12 m somewhat oblique to meridian.	488
		....	10 ±	A double neb; both e F; S; R; follows an oblique line of 4 stars 10 and 11 m.	737
3995	....	23 19 18.9	150 38 56	B; S; l E; v s v m b M to a ∗ 11 m	504
3996	Δ. 347 ?	23 23 7.8	145 2 17	p F; L; R; v g l b M; 2′...	629
3997	....	23 23 39.9	142 37 47	p B; S; R; 20″; precedes a ∗ 8 m 37s	730
		40.5	38 28	B; S; E; p s b M	498
3998	....	23 25 3.7	156 20 34	e e F; p L; 40″; very difficult, but certain	731

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.	Sweep.
3999	....	23 26 0.6	146 56 56	v B; p m E; s m b M; 30″ l; has a ✱ 9 m 23ˢ.5 p, 10″ n	504
		6.3	57 2	p B; l E; first g, then p s l b M follows a ✱ 8 m nearly in parallel......	735
4000	....	23 27 20.4	128 52 59	p B; oval; or p m E; v g b M; 3′	737
4001	....	23 32 59.5	156 55 0	e F; S; R; the p of 2; pos from the other = 210°	508
4002	....	23 33 7.5	156 54 20	e F; S; R; 25″; the following and largest of 2	508
4003	....	23 35 59.1	133 52 0	p B; S; R; p g m b M; 25″.......................................	639
		60.0	51 26	p B; R; v s v m b M to a ✱ 14 m; 50″	728
		60.2	50 55	B; S; l E; v s m b M to a small round almost stellar nucleus	489
4004	....	23 36 54.5	120 27 23	F; S; R; g l b M; has a ✱ 12 m 1′ dist following	494
		56.1	26 46	e F; S; R; has a very small ✱ following it	495
4005	....	23 39 1.1	121 27 7	B; L; R; p s b M; 2′ diam	495
		2.3	28 23	B; L; R; p s m b M; 90″ diam	494
4006	....	23 41 59.6	131 41 3	B; R; g b M; 90″	737
4007	....	23 49 5.9	134 45 43	e F; v S; R; l b M..	489
4008	....	23 49 12.8	134 39 48	v F; v S; R; l b M; follows 3 st 12, 13, and 14 m	489
4009	....	23 50 11.1	146 24 18	p B; S; R; g m b M; 25″	732
4010	....	23 54 10.5	125 11 40	v F; S; R; among S stars	493
4011	....	23 55 56.7	153 0 48	v F; v S; R; g b M; 12″...	736
		68.5	0 40	F; S; R; g b M; 15″	726
4012	....	23 56 35.2	134 11 32	e e F; v S; n f a star 7.8 m distant 3′	489
4013	III. 190	23 57 45.2	94 39 50	F; R; first v g, then p s b M; has 2 st 9 m s f	739
4014	....	23 59 41.7	120 51 33	e e F; L; m E; requires the utmost attention to perceive though the sky is perfectly pure.	620
		41.8	50 53	v F; m E; v g v l b M	495
		41.9	51 13	v F; p L; v m E; g v l b M; 2′ long	494
4015	....	23 59 55.8	124 49 17	F; p L; R; b M; 40″	635
		57.1	48 36	Not v F; L; l E; g l b M; 60″	493

APPENDIX.

Places and Descriptions of Eight Nebulæ discovered by the late Sir William Herschel, but not published in his Catalogues.

The Places are brought up to 1830 by the precessions of the determining Stars.

No.	Synon.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Description, Remarks, &c.
1	III. 982	8 28 16.2	16 29 31	Stellar } Two. The preceding is within 1′ of a small star which follows it, and which is free from the burr which affects the Stellar. III. 983 follows 24 Bode Ursæ (Groomb 1457) 3ᵐ 19ˢ, and is 2° 30′ north of that ✱. III. 982 is 6′ n of the other. Discovered Sept. 30, 1802.
2	III. 983	8 29 18.2	16 35 31	v F; S
3	II. 908	8 38 58.2	19 5 31	p B; p L; easily resolvable. I believe I see some of the stars; figure irreg; follows 24 Bo. Ursæ (G. 1457) 6ᵐ 59ˢ, and is 0° 9′ north of it. Discovered Sept. 30, 1802.
4	IV. 79	9 41 18.0	19 25 55	A v B, beautiful, ray of light, about 8′ long, 2′ or 3′ broad; brightest in the middle of all its lengths. Follows 27 Ursæ (G. 1563) 14ᵐ 12ˢ, and is 2° 27′ south of that star. Discovered Sept. 30, 1802.
5	II. 909	9 47 9.0	17 3 55	F, p L, R; the last of 3, the others are II. 333 and 334. Follows 27 Ursæ (G. 1563) 20ᵐ 3ˢ, and is 0° 5′ south of it. Discovered Sept. 30, 1802.
6	III. 979	....	....	Stellar } Three in a line, 1′ distant from each other. The place is that of the last, which precedes 191 Bode Camelopardali (G. 1643) 7ᵐ 44ˢ, and is 0° 38′ south of it. Discovered Sept. 26, 1802.
7	III. 980	....	....	v F; S
8	III. 981	10 10 17.2	9 16 5	v F; S

SYNOPTIC TABLE OF THE DATES OF THE SWEEPS REFERRED TO IN MY CATALOGUES OF NEBULÆ, DOUBLE STARS, &c.

Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.
	1823		1827		July		Feb.		Sept.		Nov.
	Nov.		Jan.	77	7	125	18	177	15	227	19 bis
1	2	40	2	78	15	126	19	178	16	228	20
	1825	41	4	79	16		March	179	17		Dec.
	April	42	5	80	18	127	5	180	18	229	16
2	10			81	21	128	6	181	18 bis		
3	11		1823*	82	23	129	9	182	18 ter		1830
	May		May	83	25	130	11		Oct.		Jan.
4	9	43	8	84	28	131	11 bis	183	1	230	..
5	21	44	29	85	29	132	12	184	4		Feb.
	Aug.		July	86	30	133	12 bis	185	6	231	9
6	20	45	1		Aug.	134	12 ter	186	9	232	10
	Sept.	46	2	87	20	135	13	187	10	233	11
7	4		Aug.	88	21	136	14	188	..	234	19
8	7	47	5	89	22	137	16	189	28	235	20
9	9	48	6	90	24	138	17	190	29		March
	Oct.		Sept.	91	25	139	19			236	4
10	4	49	10	92	26	140	20		1829	237	..
11	7				Oct.		April		May	238	15
12	11		1827	93	12	141	7	191	2	239	16
13	12		Jan.	94	13	142	9	192	4	240	..
14	13	50	21	95	16	143	10		July	241	20
15	17	51	22	96	..	144	13	193	21	242	23
		52	23	97	18	145	14	194	23	243	24
				98	22	146	15	195	27	244	25
	1826			99	..	147	16	196	29	245	25 bis
	Feb.		1821		Nov.	148	16 bis	197	31	246	26
16	13		May	100	11		May		Aug.	247	29
	March	53	29	101	12	149	1	198	1		April
17	3	54	30	102	16	150	..	199	5	248	12
18	4			103	17	151	6	200	6	249	13
19	10		1827	104	17 bis	152	8	201	8	250	17
20	11		Jan.	105	..	153	9	202	20	251	19
21	12	55	26	105½	22	154	11	203	21	252	20
22	13	56	27	106	22 bis	155	12	204	25	253	24
	April		Feb.	107	23	156	13	205	29	254	25
23	1	57	17	108	24	157	14		Sept.	255	26
24	3	58	19	109	24 bis		July	206	2	256	27
	May	59	24		Dec.	158	5	207	8		May
25	6	60	25	110	16	159	6	208	12	257	13
26	7		March	111	16 bis	160	9	209	14	258	15
27	8	61	23	112	17	161	13	210	19	259	16
28	9	62	24	113	20	162	15	211	24	260	18
	June	63	25	114	23	163	19	212	25	261	22
29	30	64	26	115	24	164	19 bis	213	29	262	24
	July	65	30	116	25	165	20	214	30	263	25
30	1	66	31	117	27		Aug.		Oct.		June
31	7		April			166	17	215	5	264	20
32	9	67	2			167	18	216	5 bis		July
33	24	68	19		1828	168	19	218	9	265	11
34	31	69	19 bis		Jan.	169	20	219	27	266	12
	Aug.	70	23	118	8	170	21	220	28	267	13
35	1	71	24	119	13		Sept.	221	30	268	14
36	2	72	27	120	18	171	2		Nov.	269	15
37	5	73	28	121	19	172	5	222	7	270	16
	Dec.	74	29	122	19 bis	173	7 ?	223	16	271	21
38	28		July	123	..	174	11	224	17	272	22
39	30	75	2		Feb.	175	12	225	18	273	26
		76	6	124	17	176	12 bis	226	19	274	27

* Nos. 43 . . . . 49 are Sweeps made in 1823 which had been mislaid, having been written on loose paper, and not found until after No. 42. As a renumbering of the intermediate Sweeps would have created confusion, it was thought better to carry on the numbers in regular succession.

Sweep.	Date.
	July
275	28
276	29
	Aug.
277	10
278	13
279	15
280	do.
281	16
282	19
283	23
	Sept.
284	7
285	8
286	10
287	11
288	12
289	13
290	do.
291	14
292	do.
293	16
294	17
295	18
296	20
297	21
298	22
299	23
300	24
301	25
302	do.
	Oct.
303	5
304	9
305	10
306	14
307	15
308	16
	Dec.
309	13
310	14
311	16
312	18
313	do.
314	20
	1831
	Jan.
315	6
316	6 bis
317	7
318	8
319	11
	Feb.
320	2
321	..
322	5
323	9
324	10
325	12
326	15
327	16
328	17
	March
329	7
330	8
331	11
332	13
333	14
334	17
335	18
	April
336	1

Sweep.	Date.
	April
337	3
338	4
339	5
340	6
341	9
342	10
343	13
344	14
	May
345	1
346	2
347	4
348	5
349	6
350	do.
351	8
352	9
353	do.
354	11
355	12
356	14
357	16
	July
358	30
359	31
	Aug.
360	3
361	4
362	5
363	6
364	8
365	10
366	11
367	12
368	14
	Sept.
369	3
370	do.
371	6
372	9
373	10
	Oct.
374	4
375	5
376	..
377	28
378	29
379	31
	Nov.
380	2
381	3
382	4
383	7
384	8
385	9
386	28
	Dec.
387	9
388	10
389	23
390	31
	1832
	Jan.
391	3
392	4
393	23
394	24
395	25
396	27
397	do.
398	29

Sweep.	Date.
	Feb.
399	3
400	no such *f*
401	7
402	26
403	..
	March
404	8
405	21
406	25
407	28
408	29
409	do.
410	30
	April
411	2
412	3
413	4
414	5
415	17
416	19
417	20
418	21
419	23
420	25
421	26
422	28
423	29
	May
424	1
425	18
426	19
427	22
428	23
	1834
	March
429	5
430	8
431	13
432	14
433	16
434	31
	April
435	1
436	3
437	4
438	6
439	10
440	11
441	do.
442	13
443	28
444	29
445	30
	May
446	1
447	2
448	3
449	5
450	6
451	8
452	10
453	13
	June
454	1
455	3
456	5
457	..
458	8
459	24
460	26
461	28

Sweep.	Date.
	June
462	29
	July
463	1
464	2
465	5
466	6
467	7
468	8
469	9
470	10
471	12
472	27
473	28
474	29
475	30
476	31
	Aug.
477	1
478	3
479	4
480	7
481	8
482	12
483	24
484	30
485	31
	Sept.
486	1
487	3
488	4
489	5
490	6
491	21
492	23
493	25
494	27
495	28
496	30
	Oct.
497	2
498	3
499	4
500	5
501	6
502	23
503	27
504	28
505	30
506	31
	Nov.
507	1
508	2
509	3
510	4
511	6
512	23
513	24
514	26
515	30
	Dec.
516	1
517	2
518	3
519	4
520	5
521	6
522	23
523	..
524	26
525	27
526	28
527	29

Sweep.	Date.
	1835
	Jan.
528	1
529	2
530	20
531	22
532	23
533	24
534	27
535	28
536	29
537	do.
538	30
539	31
	Feb.
540	1
541	2
542	3
543	4
544	17
545	20
546	21
547	22
548	23
549	24
550	25
551	26
552	27
	March
553	1
554	2
555	3
556	4
557	..
558	20
559	21
560	22
561	23
562	24
563	26
564	30
565	no such *f*
566	31
	April
567	1
568	3
569	4
570	7
571	18
572	20
573	21
574	22
575	do.
576	23
577	do.
578	24
579	25
	May
580	1
581	2
582	3
583	16
584	17
585	18
586	19
587	23
588	24
589	25
590	26
591	27
592	29
593	31

Sweep.	Date.
	June
594	1
595	2
596	16
597	17
598	18
599	19
600	20
601	21
602	22
603	23
604	27
605	28
606	29
607	30
	July
608	15
609	16
610	20
611	21
612	22
613	do.
614	23
615	24
616	do.
617	28
	Aug.
618	14
619	15
620	18
	Sept.
621	14
622	18
623	19
624	do.
625	no such *f*
626	21
627	22
628	do.
629	24
630	do.
631	27
632	no such *f*
	Oct.
633	17
634	18
635	19
636	22
637	23
638	do.
639	24
	Nov.
640	10
641	11
642	13
643	14
644	18
645	19
646	20
647	21
648	22
	Dec.
649	8
650	9
651	10
652	11
653	13
654	14
655	15
656	do.
657	16
658	20
659	24

Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.	Sweep.	Date.
	Dec.		March		July		Oct.		Jan.		June
660	25	685	14	711	3	738	4	762	5	789	6
661	26	686	15	712	5	739	5	763	do.	790	7
		687	16	713	6	740	9	764	9	791	do.
	1836	688	18	714	do.	741	12	765	25	792	8
	Jan.	689	22	715	7	742	13	766	27	793	27
662	8	690	25	716	do.		Nov.	767	28	794	..
663	9		April	717	9	743	1	768	31		Sept.
664	10	691	5	718	10	744	4		Feb.	795	21
665	11	692	7	719	12	745	5	769	1	796	23
666	17	693	15	720	13	746	8	770	do.	797	24
667	18	694	..	721	do.	747	11	771	5	798	do.
668	19	695	20	722	14	748	do.	772	7	799	25
669	20		May	723	15	749	12	773	9	800	26
670	22	696	11	724	do.	750	do.	774	28		Nov.
671	23	697	12	725	16	751	do.		March	801	28
	Feb.	698	18		Aug.		Dec.	775	2	802	29
672	8	699	do.	726	11	752	4	776	3	803	30
673	9	700	19	727	31	753	5	777	7		Dec.
674	11		June		Sept.	754	do.	778	8	804	1
675	12	701	3	728	2	755	8	779	13	805	3
676	14	702	5	729	5	756	9	780	28	806	23
677	15	703	6	730	do.	757	11	781	29	807	24
678	16	704	7	731	6	758	26	782	31	808	25
679	17	705	do.	732	11	759	30		April		
680	18	706	do.	733	12			783	1		1838
	March	707	do.	734	15		1837	784	5		Jan.
681	7	708	8		Oct.		Jan.	785	do.	809	22
682	8	709	9	735	2	760	2	786	6	810	..
683	10	710	do.	736	3	761	3	787	7		
684	..			737	4	761½	4	788	do.		

LIST OF FIGURED NEBULÆ REFERRED TO IN THE CATALOGUE.

R A. 1830. h. m. s.	NPD. 1830. ° ′	No. in Catal.	Plate.	Fig.	Synonyms, &c.
0 6 30	130 10	2315	IV.	8	Δ. 507.
0 16 26	163 2	2322	III.	1	47 Toucani (Bo.).
0 21 58	124 12	2327	VI.	19	Δ. 590 ?
0 46 52	128 37	2359	V.	10	Δ. 530.
0 53 19	163 6	2370	IV.	6	Δ. 25.
2 26 48	129 47	2487	VI.	14	Δ. 519 ? ?
3 16 58	112 8	2534	VI.	17	IV. 77.
3 27 9	126 43	2552	IV.	1	Nova.
4 5 31	123 19	2621	V.	11	Δ. 600.
4 56 52	156 43	2709	III.	3	Group in Nubecula Major.
		2710			
		2711			
		2716			
5 8 6	159 11	2775	VI.	11	Nova.
5 14 29	159 33	2802	III.	6	Group in Nubecula Major.
		2803			
		2804			
		2805			
		2808			
		2810			
5 22 36	158 4	2840	III.	2	Group in Nubecula Major.
		2842			
		2843			
		2844			
		2845			
5 26 56	95 30	....	VIII.		θ Orionis.
5 27 0	94 57	....	II.	3	c Orionis.
5 27 9	160 1	2859	IV.	7	Group in the Nubecula Major.
		2864			
		2865			
		2872			
		2875			
		2876			
5 27 45	158 58	2866	VI.	20	Group in the Nubecula Major.
		2867			
		2868			
		2869			
5 35 55	157 41	2910	III.	5	Δ 220 and group in the Nubecula Major.
		2913			
		2916			
		2918			
5 39 7	160 17	2923	IV.	9	Group in the Nubecula Major.
		2925			
		2933			
		2935			
		2936			
		2938			
		2939			
5 39 53	159 11	2941	II.	4	30 Doradûs (Bode).
5 41 ..	159 50	2948	III.	4	Group in the Nubecula Major. ☞
		2949			
5 41 ..	159 50	2950	III.	4	Group in the Nubecula Major.
		2951			
		2952			
		2953			
		2954			
7 9 40	102 55	3075	IV.	4	V. 21.
8 29 22	130 5	3131	VI.	12	
8 54 28	135 14	3145	V.	12	
9 9 9	125 54	3154	V.	8	Δ. 564.
9 55 17	115 21	3221	V.	9	
9 59 52	129 36	3228	VI.	9	
10 10 42	147 8	3239	IV.	3	
10 11 7	170 1	3241	VI.	2	
10 16 36	107 47	3248	VI.	5	IV. 27.
10 38 27	148 47	3295	IX.		η Argûs.
11 4 54	150 22	3324	IV.	10	
		3325			
		3326			
		3327			
		3329			
		3330			
12 43 36	149 26	3435	I.	2	κ Crucis.
13 15 31	132 8	3501	IV.	2	Δ. 482.
13 16 37	136 35	3504	V.	7	ω Centauri.
13 21 37	155 6	3514	VI.	1	Δ. 252.
13 27 28	119 0	3523	IV.	5	185 Centauri (Bode).
13 40 18	140 22	3541	VI.	15	
13 47 34	129 9	3548	VI.	10	
15 5 18	135 1	3594	VI.	8	
15 33 23	150 41	3610	VI.	7	
16 28 22	133 2	3641	V.	4	
16 33 54	136 42	3644	V.	6	
16 50 24	119 51	3661	VI.	13	M. 62.
17 7 19	141 33	3675	VI.	6	
17 10 37	128 18	3680	VI.	3	
17 14 33	132 40	3684½	V.	3	Milky Way.
17 19 2	113 37	3686	VI.	4	IV. 11.
17 22 43	128 57	3688	VI.	18	
17 34 31	123 37	3702½	V.	1	Milky Way.
17 39 45	120 9	3707	V.	5	VI. 13.
17 43 41	120 23	3713½	V.	2	Milky Way.
17 52 6	113 1	3718	II.	2	IV. 41, and V. 1, 2, 3.
17 53 28	114 21	3722	I.	1	M. 8.
17 55 52	153 47	3727	VI.	16	
18 10 49	106 14	....	II.	1	M. 17.
21 52 10	122 46	3908	IV.	11	
		3909			
		3910			
		3911			

OF THE

LAW OF DISTRIBUTION

OF

NEBULÆ AND CLUSTERS OF STARS

OVER

THE SURFACE OF THE HEAVENS.

(91) The distribution of nebulæ and clusters over that portion of the heavens visible in our latitudes is extremely unequal. A mere inspection of my Northern Catalogue will suffice to show, that an immense and evidently systematic inequality exists among the numbers of them which occur in each successive hour of right ascension. This is an induction "*per enumeration simplicem*"—a mere matter of statistics; and its results are not a little remarkable. The following table exhibits a synoptic view of the numbers in question:—

NUMBERS OF NEBULÆ, &c., IN EACH HOUR OF R A IN MY NORTHERN CATALOGUE.

Hour of R A.	No. of Neb.	Hour of R A.	No. of Neb.	Hour of R A.	No. of Neb.	Hour of R A.	No. of Neb.	Hour of R A.	No. of Neb.	Hour of R A.	No. of Neb.
h h		h h		h h		h h		h h		h h	
0 to 1	89	4 to 5	36	8 to 9	72	12 to 13	441	16 to 17	32	20 to 21	36
1 „ 2	109	5 „ 6	32	9 „ 10	109	13 „ 14	214	17 „ 18	18	21 „ 22	45
2 „ 3	89	6 „ 7	56	10 „ 11	154	14 „ 15	153	18 „ 19	34	22 „ 23	60
3 „ 4	24	7 „ 8	55	11 „ 12	271	15 „ 16	42	19 „ 20	37	23 „ 0	98

(92) It is evident from this that the great mass of the nebulæ in that part of the heavens visible in our latitudes, is accumulated upon the six hours of R A between 9^h and 15^h; on both sides of which the falling off is rapid, and after 15^h very sudden; while within the 6 hours in question the condensation increases to a very marked maximum between the hours 12 and 13. Another maximum, but very much less marked, occurs between the hours 1 and 2, and is also gradually shaded off on the preceding side, and more suddenly on the following.

(93) The true import of this rough and simply statistical view of the subject is not seen, however, till we come to project the places of the individual objects on a chart or globe, so as to obtain a distinct view of their mode of grouping, and a measure of their actual degree of condensation at each point. For this purpose the usual projections of the sphere are ill

adapted. In the orthographic projection, the projected representations of the equatorial zones are contracted into infinitely narrow annuli, while those of the polar ones preserve their natural magnitude. In the stereographic projection, on the contrary, the equatorial areas are unduly dilated as compared with the polar. For our purpose a projection is required which shall represent equal areas on the sphere by equal ones on the projection. The following construction will satisfy this condition.

(94) Supposing r to be the radius of the sphere, take

$$R = r \cdot \sqrt{2},$$

and with R for a radius describe a circle. This will be the projection of one hemisphere, and its area will be equal to the surface of the hemisphere. Now, to divide this circle into annuli corresponding to zones of equal polar distance on the sphere, so that the area of each annulus shall be equal to that of the spherical zone of which it is the projection, we have only to calculate a series of radii according to the formula

$$\rho = R \cdot \frac{\sin \frac{1}{2} \theta}{\sin 45^\circ}; \text{ or } \rho = 2\, r \cdot \sin \tfrac{1}{2}\, \theta;$$

and with these radii describe circles about the common centre, then will each circle be the projection of a parallel of θ° polar distance. To execute this projection in fact, however, no calculation at all is needed, for since the radius of the sphere is of no consequence, we have only to take out, upon any scale we please, the successive values of sin 30′, sin 1°, sin 1° 30′, and so on to sin 45° from a table of natural sines and these will be the radii of circles corresponding in our projection to the successive polar distances 1°, 2°, 3°, ... 90°.

(95) On this principle, having constructed charts representing the northern and southern hemispheres, divided into zones of 3° in breadth in polar distance, and into hours of R A (subdividing each of the latter into quarters), I laid down the nebulæ in each from the joint contents of both catalogues, so as to obtain a *coup d'œuil* of their distribution over the whole heavens. This, and not the construction of regular charts for publication, being the object in view, it was not considered necessary to project each individual nebula in its precise place—but only to lay down, in each rectangular space of 3° of P D, and 15^m of R A, the true number of nebulæ which had been found to exist in that area, distributing them therein uniformly, and denoting each by a round and sufficiently conspicuous dot. The numbers of such dots found to occur in the several *hours* of R A (which will suffice for our immediate purpose) are expressed in Pl. X, figs. 1, 2, which may be taken as a synoptic view of the distribution of the nebulæ in both hemispheres as it results from my own observations.* The following are the principal conclusions which may be drawn from this operation.

(96) 1st, The distribution of the nebulæ is not, like that of the milky way, in a zone or band encircling the heavens, or if such a zone can be at all traced out, it is with so many interruptions, and so faintly marked out through by far the greater part of its circumference, that its existence as such can be hardly more than suspected.

(97) 2dly, One-third of the whole nebulous contents of the heavens are congregated in a

* There are between 300 and 400 nebulæ of my Father's Catalogue still unobserved by me, and which are not included in this induction. However, they are for the most part very faint objects, and I have satisfied myself that they would have little or no effect in modifying its conclusions had they been admitted.

broad irregular patch occupying about one-eighth of the whole surface of the sphere; chiefly (indeed almost entirely) situated in the northern hemisphere, and occupying the constellations Leo, Leo minor, the body, tail, and hind legs of Ursa major, the nose of the Camelopard, and the point of the tail of Draco, Canis venatici, Coma, the preceding leg of Bootis, and the head, wings, and shoulder of Virgo. This, for distinction, I shall call the nebulous region of Virgo.

(98) 3dly, Within this area there are several local centres of accumulation, where the nebulæ are exceedingly crowded, viz. 1st, from 59° to 62° of N P D in the 13th hour of R A between the northern part of Coma and the fore legs of Chara, as also (in the same hour) from 72° to 78° N P D, between the palm branch and the northern wing of Virgo, and again, in the same hour, from 80° to 87° N P D in the northern wing and breast of Virgo. Northward the nebulous area terminates almost abruptly with a very rich patch between the nose of the Camelopard and the tail of Draco. The line of greatest condensation connecting these most condensed patches is irregular and wavy, without appearance of reference to any one particular centre, and the shading off, though patchy, is on the whole gradual.

(99) The southern portion of this great nebulous region extends but little (at least with any marked intensity) beyond the equator, though it may perhaps be considered as prolonged by one or two pretty rich patches in the 13th and 14th hours of R A, as far as the 141st degree of N P D, where, at all events, it is abruptly terminated. These patches occupy the point of the southern wing of Virgo, and the region about the tail of Hydra and head of Centaurus.

(100) The lesser nebulous region in the northern hemisphere extending in R A from about 22^h to 2^h, and in P D from 50° or 60° N P D to the equator (beyond which it also projects considerably into the southern hemisphere), is much less concentrated, and has none of those densely congregating groups or centres of accumulation which form so distinct a feature in the other. Confining ourselves at present to its development in the northern hemisphere, it occupies the chest and wing of Pegasus and the southern Fish, the area included by the connecting band of the Fishes, the northern Fish, and nearly the whole of Andromeda. This I shall call the nebulous region of Pisces.

(101) Between these principal masses an almost total disconnection exists throughout all the region from 16^h to 19^h on the one hand, and from 3^h to 6^h on the other, from the pole down to the equator, for the few nebulæ sporadically scattered over this great area are quite insufficient to convey any idea of junction, though perhaps a thread of connection may be traced across the head and sword of Perseus through Camelopardalus, with the dense mass of nebulæ which forms the northern limit of the nebulous region of Virgo. This barren region includes the constellations Aries, Taurus, the head and upper part of the body of Orion, Auriga, Perseus, Camelopardalus, Draco, Hercules, the northern parts of Serpentarius, the tail of Serpens, that of Aquila, and the whole of Lyra.

(102) Sporadic nebulæ, increasing in frequency with the increase of R A from the 6th hour, over Canis minor, Gemini, Lynx, and Cancer, lead gradually, but without any other prevalent feature in their distribution, to the region of Virgo, and complete our survey of the northern hemisphere.

(103) In the southern a much greater uniformity of distribution prevails. If we except the two Nubeculæ (which are full of nebulæ, and the greater of which is even richer in objects of that class than the densest portion of the northern group), the general character of this

hemisphere is that of alternating patches of nebulæ, and vacuities of greater or less extent, some of the latter, however, being very extensive. In one of these vacuities in which comparatively few nebulæ occur the south pole is situated, having one nebula, however, within half a degree of it (as the north pole has also one within five or six minutes). This barren region extends nearly 15° on all sides of the pole, and immediately on its borders occurs the smaller nubecula.

(104) This nubecula is insulated from communication with other nebulous patches. The case is otherwise with the larger nubecula which stands in connexion with, and in termination of, something approaching to a zone or band of connected patches of nebulæ which extends along the back of Dorado, through the following portion of Horologium across Eridanus and the following portion of Fornax, over the paws and body of Cetus to the equator, where it unites with the nebulous region of Pisces, the nebulæ growing decidedly more frequent as we approach that constellation.

(105) One of the most remarkable features in the southern nebulous system is the extraordinary display of fine resolved and resolvable globular clusters which occurs between $16^h\ 45^m$ and 19^h in R A in the region occupied by Corona Australis, the body and head of Sagittarius, the tail of Scorpio, with part of Telescopium and Ara. Here, in a circular space of 18° in radius, we find collected no less than thirty of these beautiful and exquisite objects (Nos. 3658, 3661, 3663, 3665, 3666, 3667, 3670, 3671, 3677, 3683, 3690, 3692, 3698, 3705, 3720, 3723, 3726, 3730, 3731, 3736, 3737, 3742, 3743, 3747, 3748, 3749, 3753, 3756, 3763, 3770). This is certainly something beyond a mere accidental coincidence. Are we to suppose that in this direction the visual ray encounters some branch of the general nebulous system nearer to us than the rest. Or are we to connect it with the very peculiar structure of the Milky Way in this particular part of its course, which is here unlike in its constitution to any other portion of that zone, and which passes diametrically across the circular area in question. It can scarcely be doubted on reading the descriptions of Nos. 3690, 3720, 3723, that some at least of these objects belong to and form a part of the Milky Way.

(106) The general conclusion which may be drawn from this survey, however, is, that the nebulous system is distinct from the sidereal, though involving, and perhaps, to a certain extent, intermixed with the latter. The great nebulous constellation in the northern hemisphere which I have called the region of Virgo, being regarded as the main body of this system, and subtending at our point of view an angle of 80° or 90°, it is evident that, supposing its form to approach to the spherical, our distance from its centre must be considerably less than its own diameter, so that our system may very well be regarded as placed somewhat beyond the borders of its denser portion, yet involved among its outlying members, or forming an element of some one of its protuberances or branches of which the individuals are the sporadic nebulæ confusedly scattered over the general surface of the heavens, and of which the prolongation in a direction tending towards the constellation Pisces may give rise to the apparently denser grouping of the nebulæ in that region.

(107) It must not be left out of consideration, and has been distinctly remarked by Sir Wm. Herschel as an element of whatever speculation a closer attention to this subject and a more perfect classification of nebulous objects may lead us to indulge in, that the most condensed portion, and what may fairly be regarded as the principal nucleus, of the region of

Virgo is situated almost precisely in one pole of the Milky Way. Taking that great circle as a horizon, the whole of that stratum forms, as it were, a canopy occupying the zenith, and descending thence to a considerable distance on all sides, but chiefly on that towards which the North Pole lies. The phenomena on the other side of the Milky Way, though much less characteristic, are not altogether dissimilar, the nebulous region of Pisces and Cetus standing, on the whole, in pretty nearly the same relation to that circle, the most condensed part of that stratum being elevated at an altitude of between 60° and 70° above its plane. If we leave out of view in this estimate the band of clusters of the VII. and VIII. classes which accompany the Milky Way, and a great many (probably the whole) of which are to be looked upon rather as part and parcel of that sidereal zone, than as properly belonging to the nebulous system; this division of the nebulæ into two chief strata, separated (apparently) from each other by the Galaxy, will become much more distinct and striking. Indeed, there are few features more remarkable in the constitution of the Milky Way itself than the comparative rarity of nebulæ of the 1st, 2nd, and 3rd classes within its limits. I do not mean simply comparatively with the immense number of stars, but with the area. The only parts which are exceptions to this rule are the portion of its course where it traverses the mass of globular clusters already mentioned, Art. (105), and that where it passes through the Cross and Centaur, where it encounters a faint prolongation of the nebulous region of Virgo. In any point of view which has hitherto occurred to me, the nubeculæ must be considered as exceptional. Their constitution is quite peculiar, and will be separately considered.

OF THE CLASSIFICATION OF NEBULÆ.

(108) The distinction between nebulæ and clusters of stars, must depend on two very different considerations; viz., 1st, on the power of our instrument to distinguish the very minute individuals of which a resolvable cluster, or one entirely composed of stars, may consist; and, 2ndly, on the idea we attach to the word "nebulous," that is to say, on the distinction which we conceive to exist between objects physically nebulous, and objects only optically so. An object really composed of discrete stars, will appear nebulous, or be optically nebulous when it consists of stars so small, or so close, or both, as either to be separately indiscernible by the light of the telescope, or incapable of being duly separated from each other by its defining and magnifying powers. Under different degrees of instrumental imperfection in these two respects, such an object may offer any variety of appearance, from a mere vaporous and barely discernible patch of light to a brilliant surface of mottled, or even of sensibly uniform illumination. The great nebula in Andromeda, for example, may be, and not improbably is, optically nebulous, owing to the *smallness* of its constituent stars, while the interior portion of those resolved clusters in which the stars are described as "running together into a blaze," or to "have a nucleus of a higher degree of condensation" in the centre, are so, owing to their *closeness*.

(109) As respects the idea conveyed by the word nebula, it seems not easy to draw any distinct and serviceable line of demarkation between objects optically and physically (*i.e.*, apparently and really) nebulous. We have no knowledge of any natural limit, in either direction, to

the real size and lustre of those self-luminous bodies we call stars. Masses of luminous matter, as large as mountains or planets, if congregated by millions at the vast distance of a nebula, would affect our sight armed with any conceivable amount of telescopic power we can hope to attain, individually, no more than the undistinguishable particles of a cloud of dust on a sunny day, or than the constituent aqueous spherules of an actual cloud or fog, from which the term in question derives its origin. It is between discrete and concrete *forms of matter* only than any true physical line can be drawn between a multitude of distinctly separated bodies, whether greater or less, constituting a *system*, and continuous, solid, liquid, or gaseous matter constituting a *whole*, or individual. No one has yet considered, or is likely, I presume, to consider, a nebula as a solid or liquid body (in our sense of the words) variously luminous in its different parts. The gaseous, or (to speak more properly) the *cloudy* form of matter has rather suggested itself to the imagination of those who have speculated on this subject (for we must bear in mind that a cloud is not a gas, but a mixture of gasiform with solid or fluid matter, or both, in a state of extreme subdivision). It is certainly conceivable that a continuous transparent liquid or gaseous medium may be luminous throughout its whole substance; but it will be found, I apprehend, on a careful examination of every case apparently in point, that nature furnishes no example of such a thing within the limit of direct experience. Ignited liquids (as glass, for example, or melted nitre, &c.) are demonstrably only superficially luminous. Were it otherwise, their apparent intensity of illumination would be proportional to the depth of melted matter, which is not the case. Air, however intensely heated (if perfectly free from dust), gives out no light. Even flames are more than surmised to owe their light to solid or fluid molecules existing in them *as such*, and in a state of ignition. The flame of mixed oxygen and hydrogen can hardly be doubted to owe what little light it possesses to intermixed impurities, and in the flames of carbonaceous matters, and others where metals or phosphorus are burned and fixed oxides generated, the intensity of the light bears an evident proportion to the *fixity* of the ignited molecules, on whose surfaces it may be presumed to originate by some unknown electric or other process.

(110) Waving, however, the question as to the constitution of *flame* (which I suppose no one will be disposed to contend for as the *material* of a nebula), there is no want of examples of luminous bodies floating in, or intermingled with, non-luminous transparent media. The luminous appearance of the sea, which is due to organized beings, sometimes of large dimensions, is a familiar instance. On the solar envelope, too, of whose fluid nature there can be no doubt, we clearly perceive by our telescopes an intermixture (without blending or mutual dilution) of two distinct substances or states of matter; the one luminous, the other not so, and the phenomena of the spots and pores tend directly to the conclusion that the non-luminous portions are gaseous, however they may leave the nature of the luminous doubtful, and suggest the idea of radiant matter floating in a non-radiant medium, and having a tendency to segregate itself by subsidence, after the manner of snow in air, or precipitates in a liquid of slightly inferior density.

(111) Between a cloud or mist, and a shower, there is no real distinction, but that in the latter the globules are large enough to overcome the resistance of the medium in which they exist, and acquire a greater or less velocity of descent.* If water were nearly of the same

* Waving the question as to the supposed vesicular state of water in clouds and mists.

specific gravity as air, it might be scattered through our atmosphere in large globes, with no more tendency to fall in rain than at present in a cloud, as we see in immiscible liquids of nearly the same specific gravity shaken together. Now there is nothing to prevent our generalizing the notion of a luminous cloud, and suppose the possibility of masses of luminous matter—of whatever density or variety, of whatever bulk or minuteness—forming a connected system, and prevented from collapse or from mutual interference, by the resistance of a transparent and non-luminous medium, which shall serve them as a common vehicle, and perform other useful cosmical offices to them. Such an idea, as a matter of pure speculation, has even something inviting in it, as rendering in some degree conceivable the solution of a problem otherwise almost inapproachable,—I mean that of the stability of a cluster of stars in the state of apparent condensation in which we see so many of those wonderful systems. The *dynamical* equilibrium (if I may use such a phrase to express internal mobility of parts, accompanied with a conservation of outward form and regular condensation towards a centre) of a globular, elliptic, or other cluster of *totally disconnected* stars, acted on only by central forces, cannot certainly be denied as an abstract possibility; nay, under one very peculiar condition (that of a *uniform* distribution of stars in a sphere) we perceive it to be so, and that such equilibrium must subsist. But beyond this case we cannot reason distinctly; and it certainly becomes exceedingly difficult to conceive the conditions of conservation of such a system as that of ω Centauri, or 47 Toucani, &c., without admitting repulsive forces on the one hand, or an interposed medium on the other, to keep the stars asunder.

(112) Such a mixed system might admit of a statical instead of a dynamical equilibrium, the interposed medium serving to propagate pressure and give unity to rotation, so as to bring its movements and figure under the Newtonian laws of rotatory equilibrium. Nay, if we choose to give the reins awhile to speculation, and admit the gradual absorption of such a fluid, it is far from inconceivable that a system of orbitual movements might become established among its members; at first entirely, but gradually less and less under the conservative control of its resistance and impulse, as they approached in their forms, magnitudes, and other elements, to a final state, in which the absorption of the medium should be total, and the system dynamically stable, under conditions of adjustment, such as, in an infinitely simpler form of enunciation, preserve the stability of our planetary system.

(113) But such a medium is purely hypothetical. We see, after all, only the luminous portions of a nebula, and can have no other knowledge of their aggregation or segregation than what our telescopes afford us. The distinction between nebulæ properly so called, and those which we are to consider as certainly or very probably clusters of stars, resting, as it must do, on the merely temporary and conventional ground of the capacity or incapacity of our telescopes, wholly or partially to resolve them, can never become a permanent ground of classification, since every new improvement in the powers of the telescope will cause more and more nebulæ to pass into the class of clusters.

(114) Nevertheless, granting it to be impracticable to draw any clear line of separation between nebulæ and clusters, yet their degree of resolvability, connected as it is with the absolute brightness of their constituent stars, and their distance from us, must always form an important character in their description, and is fully as much entitled to be received as an element in their classification as their total brightness, or degree of condensation about a centre, &c. It has already been remarked, Art. (44), as the result of a very extensive

induction, that the normal form of what may be called Regular Nebulæ is the Elliptic, admitting every degree of ellipticity, from the spherical to the linear form; every law of condensation, from the circumference to the centre of the apparent outline, from a uniform disc to a star-like centre, surrounded with faint and gradually fading nebulosity; every grade of brightness, from an object like ω Centauri distinctly visible to the naked eye, to the feeblest third-class nebula, barely discernible with the best telescopes; and every shade of resolvability, from stars distinctly numerable even in the middle, to a total absence of any suspicion of stars indicated by the slightest mottling of surface. Another feature, common to all nebulæ of this class, is the diminution observable in the ellipticity of their strata from without inwards, so as to approach to a spherical nucleus, however elongated their extreme elliptic outline.

(115) When sensible objects possess no qualities but such as are common to them all, and differ only in the greater or less degree in which those qualities are present in them, the only classification they admit is evidently a *classificatio per gradûs*—one grounded on the measured or estimated intensities with which those several qualities co-exist in the same individual. Classes (or rather subclasses) founded on such gradations are purely arbitrary, and admit of no natural lines of demarcation. If minerals, for example, differed from each other only in respect of hardness, transparency, and specific gravity, it would be a question of pure convenience, how many degrees of these qualities we might choose to regard as distinct from each other, and consequently how many classes we could form by their combination, in the absence of exact numerical statement, which, when attainable in each particular, goes to abolish the idea of sub-classes altogether, by assigning to each individual its precise place in the more general class. As regards the division of our great class of Regular nebulæ into sub-classes, it will amply suffice to recognize in each character five degrees—two extreme, and three medial. Pursuant to this idea I would, therefore, propose the following system of numerical sub-classification and nomenclature:—

SUB-CLASSIFICATION OF REGULAR NEBULÆ. CLASS I.

Sub-class in respect of	Magnitude.	Brightness.	Roundness.	Condensation.	Resolvability.
1	Great.	Lucid.	Circular.	Stellate.	Discrete.
2	Large.	Bright.	Round.	Nuclear.	Resolvable.
3	Middle-sized.	Faint.	Oval.	Concentrate.	Granulate.
4	Small.	Dim.	Elongate.	Graduating.	Mottled.
5	Minute.	Obscure.	Linear.	Discoid.	Milky.

(116) As regards concentration, a nebula may have a double class, since the law of condensation may be infinitely varied, so as to render, for example, such combinations as *Discoid-nuclear*, *mottled-stellate*, &c., not incompatible. In fact, the heavens furnish many such instances. Comparatively speaking, however, they are rare, and, for the purposes of general classification, to serve for the formation of a catalogue of nebulæ, such as I hope to see one day constructed, the distinctive character in respect of concentration may always be satisfactorily indicated by a single epithet or number, leaving the few remarkable cases to be specially noticed.

(117) The utility of the system thus proposed, in affording in very small compass a good

deal of information respecting the physical (or optical) characters of a nebula, in thus rendering possible a general descriptive catalogue of convenient magnitude for reference, will, I am disposed to think, be found considerable. It is not necessary, to this end, to write or print the words at length, or even to arrange the numbers separately into columns. Such a combination as I. 22435, when once the system is familiar, is quite as *distinct* as if each figure were placed in a separate column with appropriate heading, and, after a little practice, quite as intelligible as if for each number its appropriate *word* were written. Thus the above-mentioned combination reads as follows :—A nebula of the 1st class (*i.e.* regular), large, bright, elongate, concentrate, milky, a description which readily recalls to the imagination such an object as is represented in our figure 19, Pl. VI., while (to express our meaning by a few more instances) the combinations—

I. 32155—or Middle-sized, Bright, Round, Discoid, Milky.

I. 11242—Great, Lucid, Round, Graduating, Resolvable.

I. 11325—Great, Lucid, Oval, Nuclear, Milky—

will satisfactorily express such objects as are represented respectively in Pl. V. fig. 8, of this volume, fig. 88 of my northern catalogue, and Pl. IV. fig. 5 of this, or 185 Centauri. In such a system of abbreviation, o, or zero, in any place, might indicate the absence of information as to the appropriate particular.

(118) In this sub-classification, which is founded solely on the optical aspect of the nebulæ, without reference to any notions we may entertain of their intimate nature, both globular clusters and planetary nebulæ are included, the essential characters of the former being roundness and resolvability in their higher or highest degrees, and that of the latter a simply discoid round or slightly oval appearance, with or without a stellar nucleus. Nevertheless, these bodies, in their best characterized state, are so remarkable, that, without prejudice to their being duly included in the general classification, it will be well to retain for them these distinctive names, and to mark them for attention by special characters, such as ⊕ and ○, which in a catalogued arrangement may be appended to, or substituted for, the Roman numeral I. expressive of their class. Thus, ⊕ 22232 and ○ 33355 would be read, respectively—

A globular cluster, Large, Bright, Round, Concentrate, Resolvable, and

A planetary nebula, Middle-sized, Faint, Oval, Discoid, Mottled.

I should observe that in this nomenclature the term resolvable is to be understood in a somewhat stronger sense than it was originally used by Sir W. Herschel, and hitherto by myself—that is to say, not as implying merely a suspicion of consisting of stars, but that sort of partial resolution which leaves no room for doubt as to the object consisting of stars, though they are not seen so well insulated from each other as is implied in the term Discrete.

(119) Annular nebulæ belong, no doubt, to the general class of regular or symmetrical nebulæ, and in the full generality of the expression of the law of condensation, which of course admits of an internal vacuity, it would suffice to add a sixth number and word (6, Annular) to our column headed Condensation; and the occurrence of the number 6, or, for distinction's sake, a capital A in the numerical exponent of the sub-class, would sufficiently mark the character of such an object. As there are so few objects of this kind known, it is hardly worth while to make a class apart for them, but in such an arrangement as I am now proposing, the word

Annular at full length might conveniently, on that very account, be substituted for the whole numerical combination in question—(*thus*, I. Annular). In this view they would be considered as a sub-class apart, and this distinction at least they merit, if, as is most probable, their physical structure be that of hollow, elliptic, or spherical shells of stars, as I have already before suggested, Art. (53).

(120) *Double Nebulæ*, like double stars, may be either optically or physically double; but as we are here deprived, at least at present, of the criterion of orbitual motion, I should feel disposed to include under this head those cases only in which two nebulæ of the regular kind are so near each other as to mix their nebulosities, or to be, as it were, included one in another, or if disjoined, yet so close, or otherwise so related in appearance, as very strongly to suggest the notion of a real vicinity in space, and therefore of probable physical connection. In the very remarkable case of M. 62, which is a double globular cluster, or one such cluster with another *included within it* (Fig. 13, Pl. VI. of this volume), and in the cases of the nebulæ represented in figs. 68, 69, 70, and 71 of my northern catalogue, it seems impossible to doubt such physical connection. As, however, no instance has yet occurred in which the individuals of such a pair do not each belong to the regular (*i.e.* elliptic or spherical) class, it does not appear necessary to erect a separate class for them, but rather to regard them, as we have done with the annular nebulæ, as a peculiar (though very interesting) sub-class of regular nebulæ, to be specially designated in the few cases where their closeness is such as to prevent their being separately entered in a catalogue, which may be done by the letter D affixed to the numeral expression of the sub-class of the principal individual, or by special description in a note.

(121) We come now to consider the next great division of our nebulous system II. *Irregular Nebulæ*, in which class may be comprehended all which, to a want of complete and in most instances even of partial resolvability by the power of the 20-feet reflector, unite such a deviation from the circular or elliptic form, or such a want of symmetry (with that form) as precludes their being placed in class I., or that of Regular Nebulæ. This second class comprises many of the most remarkable and interesting objects in the heavens, as well as the most extensive in respect of the area they occupy. Such, for instance, as the great nebulæ about θ Orionis, η Argus, c Orionis, and k Cygni, as well as those smaller but still very extensive and most singular objects, IV. 41, 8 Messier, 17 Messier, 30 Doradûs, &c.; the partially symmetrical forms M. 51, M. 27, and M. 64, &c.; and a variety of others.

(122) To subdivide this class would almost be to create as many sub-classes as individuals, such is the capricious variety of their forms and general aspect. In consequence I shall not attempt it, but content myself with specifying as matter of nomenclature, a few terms which express characteristic features in their appearance, accompanying each with one or more examples.

1. Sub-regular nebulæ, or those which possess a certain degree of symmetry, and an evidently systematic structure. Such are M. 51, M. 27, M. 64, figured in figs. 25, 26, 27, of my Northern Catalogue, and Pl. IV. fig. 1, Pl. VI. figs. 1 and 2, of this volume.
2. Compact; such as V. 21, (Pl. 4, fig. 4) M. 78 = h. 368 (fig. 36, Northern Catalogue) &c.
3. Branching; as θ Orionis; V. 14, and 15; (figs. 33 and 34 of Northern Catalogue); c Orionis (Pl. II. fig. 3, of this volume).
4. Convoluted; as M. 17, Plate II. fig. 1.

5. Cellular; 30 Doradûs; M. 8; h. 2093 (fig. 82, N. Cat.) shown by Mason to be connected with and to form a part of V. 14. As the annular form may be conceived to originate in a spherical or ellipsoidal envelope, enclosing a hollow space of similar form within it, so may also this kind of appearance in a nebula be conceived to originate in an actual cellular structure of the nebulous mass, or in convoluted and mutually intersecting sheets or folds of a nebulous stratum variously penetrated by the visual ray.

6. Fissured; IV. 41, Pl. II. fig. 2, h. 3501 (Pl. IV. fig. 2).

7. Cometic; Pl. VI. figs. 17, 18, &c.

(123) In a synoptic catalogue of nebulæ it would hardly be necessary to indicate in addition to the class II. to which they belong, any other particulars than those which refer to magnitude and brightness, for which the two first columns of the synoptic view of the sub-classes of class I. furnish sufficient means. Thus II. 1.1, will indicate a great and brilliant irregular nebula—II. 3.3, a middle-sized (common-sized) and faint one. As nebulæ of this class will necessarily be objects of especial interest to every observer, it will answer every purpose in the synoptic catalogue which indicates their places, to give him some notice of this kind that he may be enabled to judge how far the magnifying power and light of his telescope may be expected to show him its peculiarities—or whether he may expect to see it at all.

(124) The third principal class or subdivision of these objects is that of Irregular Clusters. This class will comprehend all the clusters designated by Sir W. Herschel as of the VII. and VIII. classes, and such of those of his VI. class as are irregular in their form, and cannot be referred to the class of Globular Clusters. It will suffice to divide them into three sub-classes III. 1, III. 2, and III. 3, according to their general impression on the eye, without descending into minutiæ of detail which admit of infinite variety, according as we regard their richness in stars, the magnitudes of their constituent stars, their size, general form, or degree of concentration towards one or more centres. III. 1, in this view will indicate a rich, brilliant, and conspicuous cluster; III. 3, a poor and inconsiderable one; and III. 2, such a one as cannot properly be characterized in either of these forms of expression. This is quite sub-division enough for every useful purpose.

OF THE TWO NUBECULÆ OR MAGELLANIC CLOUDS.

(125) The general appearance of these objects to the naked eye in a clear night and in the absence of the moon (whose light completely effaces the lesser and almost also the larger of them), is that of pretty conspicuous nebulous patches of about the same intensity with some of the brighter portions of the milky way. That such is their aspect as regards their impression on the unassisted eye of others as well as my own, is evident from what is said of them by Lacaille (Acad. Sci. 1775, p. 195) and by M. Rümker (Preliminary Catalogue, &c. Hamburgh, 1832, p. 17). Whether their figures in Phil. Trans. 1828, i., which are stated to have been engraved from "very correct drawings," are eye-drafts or telescopic representations, their author has not informed us. If the latter, I am unable to reconcile them with my own

observations as regards the greater part of their details. If the former, they certainly tend to convey such a conception of their appearance as must inevitably create a sentiment of disappointment in the mind of any one (as I confess it did in mine) who, having his imagination excited by representations so striking and extraordinary, is presented for the first time with a view of the real objects. I consider, therefore, that it will not be irrelevant to lay before the reader such representations as I have been able to make of them, *entirely without telescopic aid*, when seated at a table in the open air, in the absence of the moon, and with no more light than absolutely necessary for executing a drawing at all. See Plate IX. figs. 1 and 2. They are copied from one of my working charts (pricked off, as to the positions of the more conspicuous stars from Bode's Atlas,) and on the same scale as the originals. It will not fail to be noticed that the situations occupied by both nubeculæ with respect to the surrounding stars, especially by the nubecula minor, is very different from what is represented in Bode's, and in many other charts and globes in common use. I ought to add that all my own attempts to delineate other than very small portions of the nubecula major from the telescope, have been completely baffled by the overwhelming complexity of its details. The lesser cloud is less complex—but for that very reason less interesting.

Of the Nubecula Minor.

(126) The Nubecula Minor is situated between the parallels of 162° and 165° N P D, and between the meridians of $0^h\ 28^m$ and $1^h\ 15^m$ R A. It is of a generally round form to the unaided eye, nor can any very material deviation of its centre of brightness from its centre of figure be noticed. As seen in the telescope, however, the most conspicuous and resolvable region appears to lie somewhere about $0^h\ 45^m\ 30^s$ R A, and 164° 16′ N P D, which is somewhat to the south of its middle. It is preceded at a few minutes distance in R A, by the magnificent globular cluster 47 Toucani (Bode), but is completely cut off from all connection with it; and with this exception, its situation is in one of the most barren regions of the heavens. I cannot better describe its general insulation than in the words of a memorandum in the Gage-book sweep 745. "The access to the Nubecula Minor on all sides is through a desert." Neither with the naked eye nor with a telescope is any connexion to be traced either with the greater nubecula or with the milky way. In order to convey a better idea as well of this kind of insulation as of the general character of the nubecula itself, I shall here bring into one view such incidental notes respecting these points as I find scattered up and down in the journals of my sweeps, and of the accompanying gages, noted in the intervals of actual observation.

(127) *Zones including or passing through the Nubecula.*

Sweep 441.—(Sub Polo)—Zone 162° .... 165°.

"0h. 30m. R A 164° 27′ P D. The edge of the smaller *cloud* comes on as a mere nebula.

"0h. 40m. 53·6s.—164° 24′ 7″ (a nebula). In the edge of the cloud, vision bad, objects faint and much light cut off by tree tops, but the *cloud* is not resolved, and seems a very mysterious object."

Sweep 482.—Zone 162° .... 165°. August 12, 1834.

"23h. 19m. Began. The ground of the sky very decidedly but not very richly dotted rather than 'stippled' with faint stars *. Stars of 9, 10, 11, 12 magnitudes are sparingly scattered over it."

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* For this phenomenon see more hereafter.

"0h. 2m. The lesser nubecula is now approaching, but I discern no indications in the field throughout the zone which should lead to expect any remarkable object. On the contrary, the stippled or dotted appearance mentioned at 23h. 19m. is gone and the ground is black."

"0h. 13m. 6·5s. 163° 5′ 55″. There is now a great increase of st. 13m. in the field. On further examination they appear to be the outliers of the great globular cluster" (47 Touc.) .... This cluster "is completely insulated. After it has passed, the ground of the sky is completely black throughout the whole breadth of the sweep."

"0h. 29m. 7·3s. The field begins to show more stars and to be *alive*."

"0h. 37m. 5·1s. We are now *in the cloud*. The field begins to be full of a faint light, perfectly irresolvable."

"0h. 46m. 3·7s. 164° 19′ 23″. I should consider about this place to be the body of *the cloud* which is *here* fairly resolved into excessively minute stars, which, however, are certainly seen with the left eye."

"1h. 9m. 50·2s. Re-examined by the side motion the whole *cloud* in detail and in general. The main body *is* resolved, but barely. I see the stars with the left eye. It is not like the *stippled* ground of the sky. The borders fade away quite insensibly and are less or not at all resolved. The body of the cloud does not congregate *much* into knots, and altogether it is no way a striking object, apart from the nebula and clusters." "N.B. Mirror a good deal tarnished—at least a fourth of its light."

Sweep 625.—Zone 162 .... 165. September 21, 1835.

"0h. 39m. 11·1s. 164° 0′ 52″. Here commences a very starry region."

"0h. 44m. 55·0s. 164° 13′ 22″. This seems to be the body of the *cloud*. It is a fine rich large cluster of very small stars 12 .... 18 mag. which fills more than many fields, and is broken into many knots, groups and straggling branches, but *the whole* (*i. e.* the whole of this clustering part) is clearly resolved.

"1h. 2m. 42·3s. 163° 15′ 56″. Neb., &c. The field rich with st. 11 .... 15 m."

"1h. 15m. The cloud is past, and the zone is as free of stars as before it came on."

Sweep 738.—Zone 162 .... 165. October 4, 1836.

"0h. 37m. 8·9s. 164° 22′ 18″ (a neb. taken). This is in the light part of the *cloud*.

"0h. 40m. 13·0s. 164° 2′ 8″. The field here has light in it and many stars.

"0h. 41m. 43·9s. 164° 12′ 28″ (a cluster taken). It is the preceding knot of the resolvable portion of the body of the Nubec. Min., which fills the subsequent field and consists of irregularly clustered stars 12 .... 16 .... 20 m."

"0h. 49m. 162° 4′ 18″. A field almost black. This is decidedly above (north of) the cloud."

Sweep 745.—Zone 162 .... 165. November 5, 1836.

"0h. 33m. 51·1s. 164° 20′ 54″ (a nebula taken). The field is full of the nebulous light of the Nubecula."

"0h. 43m. 19s. 164° 31′ 47″. Lower limit of the light of the Nubecula."

"0h. 47m. 21s. 163° 7′ 16″. Upper limit, but here it is starry, at the other limit nebulous.

"1h. 13m. 164° 15′. This seems to be about the end of the small cloud. The field has 15 or 20 stars in it 11 .... 15 m. Above and below, it is almost vacant."

"2h. 0m. Here, after a region of utter barrenness, commences a somewhat brighter region. N.B.—The access to the Nub. Minor, on all sides, is through a desert (Gage Bk. *f* 745)."

"2h. 42m. A miserably poor and barren region."

"3h. 30m. Most dreary since the small nubecula (Gage Bk.)."

"3h. 40. Swept assiduously since 2h. 30m., but it is a barren and utterly uninteresting region, having few stars and neither nebula nor double stars."

(128) *Sweeps above and below the Nubecula Minor.*

Sweep 616.—Zone 159 .... 162. July 24, 1835.

"22h. 50m. 23° 30′. The latter part of this zone most oppressively desolate. N.B.—Admirably well

swept." (Gage Bk.) The average of the gages during this interval was 8 stars per field of all magnitudes.

Sweep 509.—Same zone. November 3, 1834.

"1h. 9m. 59° 9′. The lower part of the sweep (*i. e.* at 162° N P D) contains a good deal of loose light, and is evidently the border of the Nubecula Minor, but there are not many stars, and the light is perfectly irresolvable and not congregated into knots or distinct nebulæ."

"1h. 28m. All this part of the sweep is singularly barren of stars, scarcely any" exist, "say on an average 2 or 3 in a field of all magnitudes from 10 to 16."

It is perhaps worthy of notice that the fine Globular Cluster Δ 62, which occurs in this zone at 0h. 57m. 161° 46′ is situated beyond the limits of the Nubecula, like 47 Touc., to which, though much inferior in brilliancy, it is yet a not unworthy fellow.

Sweep 622.—Zone 165 .... 168° N P D. September 18, 1835.

"23h. 0m. 0° 22′. Gages averaging 13 stars in the field of all magnitudes from 8·9 downwards," (Gage Bk.)

"0h. 22m. No sign of the *cloud*." (Gage Bk.)

"0h. 25m. 22·2s. Looking well out for symptoms of the lesser *cloud* but I perceive none."

"1h. 0m. No symptoms of the cloud unless perhaps a very feeble light in the field at the upper edge of the zone." (164° 56′) (Gage Bk.) Average of Gages since 0 22 = 13 stars per field.

"1h. 10m. A most dull and uninteresting sweep." (Gage Bk.)

"1h. 32m. 12·7s. Swept steadily from 0·50—sky 10, but nothing of the slightest interest. Very few stars above 10 m., and all single." Average of Gages, per Gage Book, from 1h. 0m. to 4h. 0m., 12 stars per field.

(129) There are 37 objects entitled to entry in the Catalogue, as nebulæ, or clusters, within the area of the Nubecula Minor.

Of the Nubecula Major.

(130) The Nubecula Major is situated between the parallels of 156° and 162° N P D, and the meridians of $4^h\ 40^m$ and $6^h\ 0^m$ in R A. Its brightest, and for the most part, unresolved portion (which has been pitched on several times in sweeping as "the main body of the cloud") is situated in $5^h\ 20^m$ R A and 159° 40′ N P D, but the whole region between $5^h\ 10^m$ and $5^h\ 30^m$ in R A, and from 158° 50′ to 160° 10′ in N P D, is almost equally entitled to be so called. The brightest and richest region of resolved and clustering stars is situated about $5^h\ 30^m$ R A, 157° 0′ N P D.

(131) The Nubecula Major, like the Minor, consists partly of large tracts and ill-defined patches of irresolvable nebula, and of nebulosity in every stage of resolution, up to perfectly resolved stars like the Milky Way, as also of regular and irregular nebulæ properly so called, of globular clusters in every stage of resolvability, and of clustering groups sufficiently insulated and condensed to come under the designation of "clusters of stars," in the sense in which that expression is always to be understood in reading my Father's and my own catalogues. In the number and variety of these objects, and in general complexity of structure, it far surpasses the Lesser Nubecula; some idea of which may be formed by comparing the numbers of registered nebulæ and clusters in each. For while, within the limits assigned above to the latter, the number of such nebulæ and clusters amounts only to 37, and taking in six outliers, which may be regarded as forming part of its system, at most to 43, (a very remarkable concentration of such objects already, within an area not much exceeding ten square degrees),—the

former within an area of about 42 square degrees, allows us to enumerate no fewer than 278 (without reckoning between 50 and 60 outliers, immediately adjacent, and which may very fairly be regarded as appendages of the nebulous system of the Nubecula Major) making an average of about $6\frac{1}{2}$ to the square degree, which very far exceeds anything that is to be met with in any other region of the heavens. Even the most crowded parts of the stratum of Virgo, in the wing of that constellation, or in Coma Berenices, offer nothing approaching to it. It is evident from this, and from the intermixture of stars and unresolved nebulosity which probably might be resolved with a higher optical power, that the nubeculæ are to be regarded as systems *sui generis*, and which have no analogues in our hemisphere.

(132) To the naked eye, as shown in Fig. 2. Pl. VII., the greater nubecula exhibits the appearance of an axis of light (very ill-defined indeed, and by no means strongly distinguished from the general mass) which seems to open out at its extremities into somewhat oval sweeps, recalling, in some faint degree, the appearance of that extraordinary object Mess. 27. It would be strange, indeed, but not beyond the analogies of other wonderful disclosures effected by optical improvements, if instruments yet to be created, or even possibly those already in progress, should one day analyse this last mentioned object into subordinate groups and systems of, perhaps, equal complexity. In the nubecula itself, there is a nebula (h. 2878) which, as will be seen in the description and remarks annexed to its observation in the Catalogue, has given rise to a similar train of speculation.

(133) The only object which stands at all conspicuously distinguished from the general misty illumination of the greater nubecula (at least to my eye), is the great looped Nebula 30 Doradûs of Bode, which, however, is merely to be perceived as a small indistinct patch, evidently not a star, and that only in fine nights. Of this object, an ample description has been already given, to which I shall here only add, that it is unique even in the system to which it belongs, there being no other object in either nubecula to which it bears the least resemblance. Of the very peculiar character of several other of the nebulous constituents of the nubecula when viewed in the 20 feet reflector, sufficient specimens have been given in figures 2—6, Pl. III., figs. 7, 9, Plate IV., and figs. 11, 20, Plate VI.

(134) The immediate neighbourhood of the Nubecula Major, is somewhat less barren of stars than that of the Minor, but it is by no means rich, nor does any branch of the Milky Way whatever form any certain and conspicuous junction with, or include it; though on very clear nights I have sometimes fancied a feeble extension of the nearer portion of the Milky Way in Argo (where it is not above 15° or 20° distinct) in the direction of the nubecula. On the whole, however, I do not consider this appearance as more than would be accounted for by the general increase of the number of small stars which, in almost every part of the course of the Milky Way, accompany its borders, and, in a telescope, announce its approach. I have encountered nothing that I could set down as *diffused nebulosity* anywhere in the neighbourhood of either nubecula.

(135) I have already stated that the excessive complexity of detail in this object baffled every attempt to delineate the whole or any large portions of it by the aid of the telescope. It was my wish to have done this, so as to present a correct and magnified drawing of it, and to this end I took roughly, with the equatorial, the place of every star visible in that instrument down to the 10th magnitude, in both Nubeculæ, with a view to the formation of charts precise

enough, and sufficiently detailed to serve as the groundwork of such drawings of both objects. This, in itself, was no trifling operation, when conducted, as it was, in such a manner as I shall describe, so as to secure the observation of *every* visible object, without the possible escape of any (except by the intervention of unperceived cloud). It was, however, executed in a series of 34 zones, observed (as regards the Nubecula Major) between Nov. 2, 1836, and March 26, 1837. The series for the Nubecula Minor (as less interesting) were deferred, and were not completed till December, 1837. The results of these observations, reduced by clock and index errors obtained from stars occurring in the zones, are contained in two Catalogues, hereto subjoined; and in order to render them as complete as I have the means of doing, all the objects observed in the 20 feet have been also inserted which fall within the limits prescribed for each. By far the greater part of the nebulæ and clusters are in this predicament, the power of a 5-inch achromatic object-glass being inadequate to render visible more than a few of the brighter and more conspicuous among them. But the drawings proved beyond my unassisted power to execute, and I was obliged, though with regret, to rest content with having, at least so far, roughed out the groundwork of them, and prepared the way for the more successful operations of some other astronomer, to whom I earnestly recommend the completion of a work at once so interesting in its performance, and instructive in its result.

(136) The process of zone observation, followed with the equatorial, is applicable to the *complete* mapping down of any given region of the heavens, and is as follows:—The index error of the declination circle being ascertained, clamps are screwed on the limb of that circle, so as to allow the telescope a motion of only a single degree on the meridian, viz., from one whole degree in polar distance to the next, allowing 1′ of overlapping on either side, which is ample when the polar axis is in good adjustment. The combined error of clock and hour circle being also ascertained, the instrument is set to a given right ascension (that fixed upon for the commencement of the area to be mapped—allowing also a minute of time antecedent, as margin), and the observation commences by sweeping with the telescope on the declination circle, up and down from clamp to clamp with a very faintly illuminated field, just sufficient to allow the cross wires to be seen, which of course, for this purpose, must be placed parallel and perpendicular to the medium. This sweeping movement is carried on by hand, slowly and steadily, without moving the right ascension handle, until an object is seen, when the sweeping motion is arrested, the object brought to bisection on the horizontal wire, and the transit taken over the vertical. The circles are then read off, and the observation registered. By this time the object will have advanced in the field beyond the meridian wire. It is then to be brought back *precisely* to that wire by moving the right ascension handle, and the loss of time being thus recovered, the sweeping recommences from the very same point of R A, until another object comes within the range of observation. In this way of operating, by following the heavens in their diurnal movement, it is evidently impossible that any object within the optical power of the instrument can escape being observed, if the attention be kept sufficiently alert, and no clouds intervene. I can scarcely flatter myself that literally *every* star down to the 10th magnitude which exists in the areas so observed of the nubeculæ will be found in these Catalogues; but I feel assured that the number which have escaped of that and larger magnitudes must be very small. It was not considered necessary to go over the work twice. Independent of the value of time under all the circumstances, *the sweeping position, at considerable altitudes, with any*

instrument but a reflector is so excessively painful (and indeed so permanently injurious to the muscles of the back and neck), that it is scarcely endurable beyond an hour at a time, for which reason alone I felt little inclination to repeat it.

(137) The places of the objects in the Catalogues annexed, as has been said, are rough. Their accuracy amply suffices, however, for the intended purpose. In polar distance there can hardly be more than 1′ error, that being the limit of exactness in reading the declination circle. In R A, I presume also that an error of 12 sec. of time (corresponding at this polar distance to about 1′ of space) may occasionally occur from a similar cause as respects the hour circle reading, which, as well as the declination circle, being intended only for setting the instrument, and not for any nice determination of places, admitted of no greater precision. Comparing the places of such *stars* as have occurred in several zones, I find no instance of a greater discordance in the equatorial places between the extreme determinations and the mean of all in A R, in the Catalogue of the greater nubeculæ, and only one in N P D even in the case of nebulæ, which, from their faintness in the equatorial, admit of less certain observation. In the Catalogue of the nubecula minor, being materially nearer to the pole, the discordances in R A are apparently, but not really, greater, and in P D there is only one star (No. 189, Cat.), and no nebula which exceeds the limit assigned.

(138) In this respect, however, the observations are suffered to speak for themselves, since in these Catalogues, as well as in those of the nebulæ and double stars, each individual result of observation has been set down without taking means, and none have been rejected for discordance. The nebulæ observed in the sweeps are also inserted for the sake of comparison, as well as to complete the nebulous part of the Catalogue. The stars observed in the sweeps have been added for a similar reason, and for the sake of comparison with the Brisbane Catalogue. The Catalogues are by this somewhat extended in bulk, it is true, but on the whole they present in this form a fairer picture of the work done.

(139) In the following catalogues, the first column contains the general number, for each; the second the object, star (S) Nebula (N.), Globular Cluster (⊕) or cluster of stars (C). Column 3 contains the magnitude of the star as estimated at the time of observation rejecting quarter magnitudes, or the degree of brightness of the nebulæ, expressed by the Roman numerals, as in my Father's classes I. II. III. or otherwise, following the nomenclature and notation of his Catalogues. The fourth column contains the right ascension, and the fifth the polar distance reduced to 1830.0. Lastly, column 6, contains the number of the zone in which the object has been observed or the indication of its being inserted from a 20-feet sweep, characterized by the letter *f* in italics. Identifications of stars with stars in the Brisbane Catalogue, and other remarks are placed at the end of the Catalogues, and referred to by the general numbers. In the Catalogue of the Nubecula Minor, it will be noticed that some of the zone observations have extended beyond the limits of R A fixed on, both ways as the boundary of the Nubecula. The stars so observed are retained for the sake of any possible occasion which may arise hereafter of referring to them. In this Nubecula, it ought to be mentioned (or at least in the area proposed to be mapped), a small portion (between the parallels of 164° and 165°, and from R A $0^h\ 45^m$ to $1^h\ 16^m$) by some inadvertence escaped being included in the equatorial zones.

(140) Several stars of the Brisbane Catalogue, which (supposing their places in that

Catalogue to be correct) have not been encountered in the zone observations, are inserted into the appended Catalogues by bringing up their places to 1830. Six such cases occur in the Nubecula Minor (see Nos. 29, 70, 123, 131, 136, 155). Of these Nos. 29 and 70 (B 28 and 83) seem to be merely duplicates of other stars of that Catalogue, which I have found in their places, originating in misreadings or errors of reduction therein committed. Nos. 123 and 131 (B 120 and 126) occur in the unobserved space alluded to in the last article. In the case of No. 136 (B 129), it appears to be the star No. 133, with 1^m error in R A. No. 155 (B 150, or 151, for these are one star) was missed by a want of exact overlapping in R A in zones 4 and 34. In the Catalogue of the Nubecula Major, I have no reason to suppose that any of the Brisbane stars which really exist have escaped observation. Several cases of duplicates and probable misreadings or errors of reduction in the Brisbane Catalogue indeed occur, but they are not such as to leave any doubt as to the identity of the stars.

FIRST APPROXIMATION TOWARDS A CATALOGUE OF OBJECTS

IN THE

MAGELLANIC CLOUDS,

AS OBSERVED WITH THE SEVEN-FEET EQUATORIAL

AND THE

TWENTY-FEET REFLECTOR.

CONTAINING THE PLACES FOR 1830.0

OF

919 STARS, NEBULÆ, AND CLUSTERS IN THE GREATER

AND OF

244 IN THE LESSER NUBECULA.

INTENDED AS

PREPARATORY TO THE CONSTRUCTION OF CHARTS OF THE NUBECULÆ AND TO THE FUTURE EXECUTION OF DRAWINGS OF THEM IN DETAIL.

STARS, NEBULÆ, AND CLUSTERS, IN THE NUBECULA MINOR.

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.	No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
1	S	10	0 0 32	163 25 54	7	51	S	10	0 24 3	163 6 24	7
2	S	9′	0 1 37	162 4 11	8			9′	0 10	6 28	4
		9′	49	4 54	7	52	S	9′	0 24 59	163 7 16	1
3	S	9	0 1 38	162 54 41	8	53	N	III.	0 25 48	164 3 8	∫
4	S	10	0 1 39	162 32 41	8	54	S	6	0 26 9	162 12 14	∫
5	S	10	0 1 45	162 31 41	8			7	11	11 50	2
6	S	7′	0 2 3	164 10 54	7			7	15	12 46	1
		6	0 0 14	10 20	∫	55	S	10	0 27 36	163 28 58	4
7	S	10	0 3 0	163 33 24	7	56	S	9′	0 28 0	163 47 28	4
		10	0	32 54	7	57	S	9′	0 28 41	162 28 46	1
8	S	9′	0 3 2	163 11 34	7	58	S	9′	0 28 49	164 49 32	6
9	S	10	0 3 11	164 5 54	7		..	9′	51	49 5	∫
10	S	9	0 3 17	163 13 34	7	59	S	8′	0 28 50	164 9 55	∫
11	S	9	0 3 44	162 54 56	8			8′	57	9 28	4
12	S	10	0 4 32	164 1 54	7		S	8′	58	9 32	6
13	S	8′	0 5 4	162 28 41	8	60	N	III.	0 29 8	164 6 25	∫
14	S	9	0 5 7	162 25 1	8	61	S	9	0 29 27	163 46 48	4
15	S	10	0 5 29	162 22 41	8	62	S	10	0 30 36	162 37 46	1
16	S	9′	0 6 39	162 14 41	8	63	S	9′	0 30 45	162 47 46	1
17	S	9	0 6 58	163 7 41	8	64	S	9′	0 30 54	162 35 16	1
		9′	67	7 54	7	65	S	8	0 31 37	164 53 2	6
18	S	9′	0 7 31	162 40 41	8		S	8	41	53 50	∫
19	S	8′	0 7 38	162 21 41	8	66	S	8	0 31 38	164 58 43	∫
20	S	8	0 8 1	162 11 41	8	67	S	7′	0 31 58	164 4 14	∫
21	S	9′	0 9 21	162 51 41	8				60	4 32	6
22	S	10	0 9 44	162 56 41	8			7	61	4 28	4
23	S	10	0 9 58	162 11 11	8	68	S	9	0 32 8	163 12 58	∫
24	S	9	0 10 6	162 49 11	8		S	8	14	12 48	4
25	S	9	0 10 23	162 15 41	8	69	S	9	0 32 47	162 2 50	2
26	S	8′	0 10 47	162 19 41	8		S	9	54	3 46	1
27	S	10	0 11 44	163 53 24	7	70	S	7′	0 32 54	164 13 17	..
28	S	9′	0 12 2	163 45 54	7	71	S	9′	0 32 54	162 33 46	1
29	S	7	0 12 44.4	163 0 21	..	72	S	8′	0 33 27	164 40 32	6
30	S	8′	0 12 52	162 54 41	8	73	S	8	0 33 42	164 53 21	6
31	S	9	0 12 57	162 7 1	8	74	N	II.	0 33 52	164 19 47	∫
32	S	8′	0 14 46	163 58 54	7	75	N	III.	0 33 55	164 23 56	∫
33	S	10	0 16 9	163 16 54	7	76	S	9	0 34 14	162 33 46	1
34	S	9	0 16 15	163 12 24	7	77	N	II.	0 34 40	164 17 10	∫
35	S	10	0 16 19.3	163 2 0	∫	78	S	10	0 34 52	164 3 28	4
36	⊕	..	0 16 24	163 2 11	8			10	53	3 8	∫
			24	0 54	7	79	S	10	0 34 57	165 1 32	6
	⊕	VI.	26	1 35	∫	80	S	9′	0 35 7	165 6 12	6
			26	1 5	2	81	S	9′	0 35 33	164 36 32	6
			29	1 5	2	82	N	III.	0 37 5	164 31 32	∫
			..	1 46	1	83	N	II.	0 37 10	164 22 10	∫
37	S	11	0 16 35	163 3 24	7	84	S	9	0 37 13	164 39 22	6
38	S	9	0 16 36	162 56 46	1	85	S	10	0 37 38	163 14 48	4
		9	37	56 20	2	86	S	8	0 37 52	162 6 46	1
39	S	11	0 17 19	163 2 54	7		S	8	53	6 20	2
40	S	9	0 17 22	163 33 24	7		S	9	55	6 8	∫
41	N	II.	0 19 4	162 28 23	∫	87	S	9	0 37 58	164 45 32	6
42	S	9	0 19 22	162 9 16	1	88	S	10	0 38 2	163 11 38	4
		9′	22	11 50	2	89	S	10	0 38 12	164 25 32	6
43	S	8′	0 20 7	162 50 20	2	90	S	9′	0 38 20	164 44 32	6
44	S	8	0 20 12	162 48 46	1	91	S	10	0 38 37	164 9 32	6
		8′	13	162 51 20	2	92	N	II.	0 39 6	164 18 28	∫
45	S	9′	0 20 17	163 4 46	1	93	N	II.	0 39 10	164 0 53	∫
		10	40	4 28	4	94	N	II.	0 39 38	164 26 36	∫
46	S	10	0 20 22	163 6 24	7	95	S	9	0 39 45	164 24 38	∫
47	S	10	0 20 31	162 7 50	2			10	50	24 2	6
48	S	9′	0 22 25	164 42 32	6	96	S	9′	0 39 49	162 42 46	1
49	S	9′	0 23 2	164 1 24	7	97	S	9′	0 40 5	163 31 58	4
		9′	20	1 52	6	98	N	II.	0 40 17	164 1 51	∫
		9′	25	1 28	4	99	S	10	0 40 53	163 46 28	4
50	S	9′	0 23 54	165 6 32	6	100	N	III.	0 40 58	164 24 55	∫

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.	No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
101	Cl	..	0 41 44	164 12 28	∫	159	S	10	1 3 4	163 49 45	34
102	N	III.	0 42 16	164 27 52	∫	160	N	..	1 3 6	163 48 15	34
103	S	10	0 42 49	164 29 32	6		N	I.	10	47 37	∫
104	S	10	0 42 53	164 16 32	6	161	S	8′	1 3 11	162 44 42	2
105	S	9	0 43 26	163 4 16	1			9	23	44 47	∫
	S	9	40	3 28	4			8′	28	45 45	34
106	S	9	0 43 20	164 24 57	∫	162	N	III.	1 3 32	162 40 32	∫
		9	27	24 32	6	163	S	10	1 3 40	163 47 45	34
107	S	9′	0 43 51	162 27 46	1	164	S	10	1 3 42	163 56 45	34
108	S	10	0 43 57	164 2 32	6	165	S	9′	1 3 49	163 32 45	34
109	S	9′	0 44 14	164 31 32	6			9′	53	32 45	34
110	S	10	0 44 29	164 24 32	6	166	S	10	1 3 51	163 27 45	34
111	S	7′	0 44 29	162 5 20	2	167	S	10	1 4 2	164 6 45	34
		7′	0 44 29	5 16	1	168	S	10	1 4 16	163 6 45	34
		7	0 44 33	4 50	2	169	S	10	1 5 2	163 38 45	34
112	S	10	0 44 39	164 24 2	6	170	S	10	1 5 2	162 57 45	34
113	N	III.	0 45 13	164 4 37	∫	171	S	7′	1 5 3	163 51 45	34
114	S	10	0 45 17	164 57 2	6			8	4	52 16	∫
115	S	9′	0 45 17	162 47 20	2	172	S	9′	1 6 2	163 56 45	34
116	S	10	0 45 18	163 36 28	4	173	S	10	1 6 9	164 5 45	34
117	Cl	VI.	0 45 30	164 16 22	∫	174	S	9	1 6 12	163 4 42	2
118	S	9″	0 45 46	162 42 50	2			9′	12	5 45	34
119	N	II.	0 46 12	164 18 17	∫			9	14	5 45	34
120	N	III.	0 47 12	164 18 46	∫	175	S	10	1 6 45	163 10 45	34
121	N	II.	0 47 19	163 7 10	∫	176	S	10	1 7 1	163 22 45	34
	N		29	7 20	2	177	S	10	1 7 47	162 31 45	34
122	S	10	0 47 44	163 4 50	2			9′	52	31 42	2
123	S	7	0 47 55	164 47 35	..	178	S	9	1 7: 57	162 33 45	34
124	S	10	0 48 8	162 51 20	2	179	S	10	1 7: 59	162 29 45	34
125	N	III.	0 48 12	163 9 48	∫	180	S	10	1 8 27	163 22 45	34
126	S	10	0 48 21	162 48 20	2	181	S	9′	1 8 45	162 36 42	2
		10	22	20	2			9′	53	35 45	34
127	S	10	0 48 54	163 3 20	2	182	N	II.	1 9 0	164 11 40	∫
128	S	6	0 49 12	165 13 43	..	183	S	10	1 9 21	164 6 45	34
129	S	9′	0 50 23	164 2 58	4	184	S	9′	1 9 41	163 38 45	34
130	N	I.	0 50 24	163 23 58	4	185	N	..	1 9 44	162 28 12	2
			25	23 21	∫		N	II.	47	26 46	∫
131	S	7′	0 50 32	164 44 59	..	186	N	II.	1 9 59	164 12 14	∫
132	S	10	0 50 59	163 54 58	4	187	S	9′	1 10 2	164 10 45	34
133	S	8′	0 51 7	163 59 28	4	188	N	II.	1 10 53	164 14 8	∫
134	S	10	0 52 10	162 11 20	2	189	S	10	1 12 45	162 30 12	2
135	N	III.	0 52 16	165 22 12	∫			10	12 52	162 27 45	34
136	S	7	0 52 30	163 59 14	..	190	S	10	1 13 0	162 50 45	34
137	N	..	0 53 15	163 5 12	2	191	S	8′	1 13 11	164 11 45	34
	N	..	16	6 28	4	192	S	9	1 13 37	163 36 45	34
	Cl	VI.	19	5 54	∫	193	S	8′	1 13 53	162 0 42	2
138	S	10	0 53 20	162 33 42	4			8′	59	0 15	34
139	S	8	0 55 14	163 36 28	4			8	61	0 43	∫
		7	14	37 3	∫	194		..	1 14 0	164 15 ..	∫
140	S	8	0 55 44	162 28 42	2	195	S	10	1 14 47	164 5 45	34
		8	54	27 28	∫	196	S	9	1 14 56	162 41 12	2
141	S	10	0 56 12	163 7 48	4			8′	58	40 45	34
142	N	III.	0 56 28	162 32 15	∫	197	S	9′	1 14 58	162 44 12	2
143	S	9′	0 57 20	162 59 42	2			9	63	43 45	34
		9	29	60 18	∫	198	S	10	1 15 11	163 26 45	34
144	⊕	I.	0 57 27	161 45 41	∫	199	S	10	1 15 18	163 22 45	34
145	S	10	0 57 28	163 27 28	4	200	S	8	1 15 40	163 37 45	34
146	S	9	0 57 47	163 15 48	4			8	42	38 36	∫
147	N		0 57 56	162 57 42	2	201	S	9	1 15 53	163 34 45	34
	Cl	VI.	57	58 9	∫	202	S	9	1 16 40	162 39 57	33
148	N	II.	0 58 30	163 44 4	∫	203	S	8′	1 16 40	163 55 57	33
			30	44 28	4	204	S	10	1 16 47	163 10 45	34
149	S	10	0 58 30	163 40 28	4	205	S	10	1 16 47	163 5 45	34
150	S	9	0 58 47	163 10 12	2	206	S	9′	1 16 48	163 52 57	33
151	S	10	0 59 12	162 23 12	2	207	S	10	1 16 49	163 8 45	34
152	S	10	0 59 16	162 47 12	2	208	S	9	1 16 51	162 38 42	2
153	S	8	0 59 34	162 38 42	2	209	S	9′	1 17 0	163 26 57	33
		7	35	38 58	∫	210	S	9′	1 17 24	162 28 57	33
154	N	III.	0 59 48	162 54 18	∫	211	S	10	1 18 2	163 21 57	33
155	S	7	0 59 57	163 27 35	*	212	S	10	1 18 4	162 20 57	33
156	S	9′	1 0 57	162 12 42	2	213	S	10	1 18 5	162 6 57	33
157	N	III.	1 2 29	162 40 11	∫	214	S	10	1 18 17	162 26 57	33
158	N	II.	1 2 43	163 16 1	∫	215	S	9′	1 18 47	163 19 27	33

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.	No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
216	S	9	1 19 12	162 53 57	33	227	S	9	1 24 5	164 9 57	33
		9′	17	53 42	2		S	9	6	9 27	33
217	S	9	1 19 26	162 23 57	33	228	S	8′	1 24 30	162 48 57	33
		9	27	24 42	2		S	9	30	48 57	33
218	S	8	1 19 31	163 12 57	33	229	S	9′	1 25 13	163 4 57	33
		8	36	12 37	ʃ	230	S	10	1 25 37	163 50 57	33
219	S	9	1 19 31	162 23 57	33	231	S	9′	1 25 39	163 52 57	33
		9	37	24 42	2	232	N	I.	1 25 45	164 25 56	ʃ
220	S	10	1 19 49	162 46 57	33	233	S	8	1 26 36	164 1 57	33
221	S	9	1 20 39	162 56 42	2	234	S	10	1 26 40	163 56 57	33
		9	43	56 57	33	235	S	10	1 26 57	163 54 27	33
		8	45	56 18	ʃ	236	S	10	1 27 30	163 38 57	33
222	S	10	1 20 50	163 21 27	33	237	S	9′	1 27 54	162 18 57	33
223	S	9′	1 21 18	162 5 57	33	238	S	9′	1 28 55	162 45 57	33
		9′	24	5 57	33	239	S	9′	1 30 54	163 10 27	33
224	S	10	1 21 57	163 38 57	33	240	S	9′	1 31 44	163 12 57	33
		9	69	38 8	ʃ	241	S	9	1 32 3	163 36 57	33
225	S	8	1 23 5	162 34 12	2	242	S	9	1 32 17	163 41 57	33
		8	17	35 22	ʃ	243	S	10	1 35 3	163 33 57	33
		7	34	33 57	33	244	S	9′	1 35 37	164 0 57	33
226	S	8′	1 23 15	163 38 27	33						

NOTES ON THE FOREGOING CATALOGUE.

No.	Note.
6	is B. 6.
29	B. 28. Not observed by me. I presume it to be B. 29, with 5′ error in P D.
30	B. 29.
34	B. 36 = B. 37.
35	The D ∗ in ⊕ 47 Touc.
36	B. 38 = 47 Touc.
37	The preceding of two.
38	B. 41.
39	The following of two.
40	B. 42.
44	B. 48.
45	B. 50. 5′ error in P D in the Brisbane catal.
51	B. 60.
54	B. 66.
57	B. 73.
59	B. 74.
61	B. 75 = B. 76.
65	Has a st 10 m south about 2′ distant.
67	B. 80. Has a star 10 m 75° s p, distant about 3′.
70	B. 83. Not observed by me. Is most probably B. 80, with 1^m error in R A, and 10′ in N P D.
72	B. 88 = B. 90. 1^m error in R A, in B, or in my obs.
73	B. 85. Place from B. Seen by me in zone 6, but place not taken, for some reason not apparent.
81	B. 91.
84	B. 98.
86	B. 101.
87	B. 102.
90	B. 104. The R A in the Brisbane cat has 39^m.
97	B. 105.
105	B. 111.
106	B. 110.
110	The preceding of 2.
111	B. 112.
112	The following of 2.
117	The middle of the great resolved cluster of the Nubecula Minor.
123	B. 120. Not observed by me.
128	B. 123. Not observed in the zones, being beyond their limit; but is the most conspicuous star (5.6 m) to the naked eye close to the Nubecula.
130	B. 124. The zone observed gives 49^m R A, but 4 coinciding observations in sweeps make it 50.
131	B. 126. Not observed by me.
136	B. 129. Do. But I presume this to be identical with No. 133, with 1^m error of R A in the Brisbane catal.
137	B. 131.
139	B. 139.
140	B. 140.
143	B. 143. 5′ error in the P D of the Brisbane catal.
144	B. 142.
150	B. 146.
153	B. 148.
155	B. 150 = 151. Not observed by me. There is certainly no such double star in this place.
161	B. 164.
164	B. 161 ?
171	B. 169.
172	B. 170.
178	The minute of R A should perhaps be 6.
179	Do.
189	No doubt the same star, with a mis-reading in P D in one or other observation.
192	B. 184.
193	B. 185.
194	The Nubecula Minor terminates at this place, as observed in the 20-feet. One minute further in R A, it is completely past.
196	B. 189.
197	B. 191.
200	B. 194.
202	B. 198.
203	B. 200.
208	B. 198.
217	B. 206.
218	B. 207.
219	On parallel of B. 206.
224	B. 211.
225	B. 213.
230	The preceding of 2.
231	The following.
234	The preceding of 2.
235	The following of 2.

STARS, NEBULÆ, AND CLUSTERS, IN THE NUBECULA MAJOR.

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
1	S	9	4 41 7	156 12 54	12
2	S	8	4 41 20	157 12 55	∫
	..	7′	21	13 15	32
3	S	8	4 41 58	161 48 25	16
4	S	8′	4 42 2	158 55 16	5
	..	8	5	55 53	∫
5	N		4 42 13	156 7 25	∫
6	S	8′	4 42 36	156 50 36	∫
		8′	43	49 54	13
7	S	8′	4 42 42	157 43 15	32
8	S	10′	4 42 43	160 31 13	15
9	S	10′	4 42 46	160 30 43	15
10	S	10	4 43 4	158 2 15	32
11	S	10	4 43 4	158 0 45	32
		9′	6	0 20	∫
12	S	9	4 43 5	160 18 43	15
13	S	9′	4 43 12	156 40 24	13
14	S	8	4 43 12	157 3 3	∫
	..	7′	13	4 15	32
15	S	10	4 43 22	159 24 16	3
16	S	9	4 43 28	157 6 45	32
17	N		4 43 47	160 7 20	∫
18	N		4 44 ±	160 50 ±	∫
19	N	III.	4 44 26	159 7 48	∫
20	S	8	4 44 27	161 47 55	16
21	S	6	4 44 48	161 13 55	16
		5′	48	14 35	∫
22	S	10	4 44 53	158 25 44	5
23	S	10′	4 45 9	160 36 13	15
24	S	8	4 45 20	158 19 43	∫
		8′	29	20 12	5
25	S	10	4 45 22	157 53 15	32
26	S	7′	4 45 23	156 22 40	∫
		7′	25	22 24	13
27	S	8′	4 45 35	156 48 54	5
28	S	10	4 45 44	160 40 43	15
29	S	10	4 45 57	157 41 15	32
30	S	10	4 46 9	157 35 15	32
31	S	10	4 46 18	157 55 15	32
32	S	9	4 46 32	156 17 41	∫
		9	35	16 54	13
33	S	10	4 46 34	160 56 43	15
34	S	10	4 46 34	156 21 11	∫
35	S	9′	4 46 39	158 0 15	32
36	S	10	4 46 47	156 7 24	13
37	S	10	4 46 56	156 25 24	13
	S	9	57	24 36	∫
38	S	10	4 46 58	157 25 15	32
39	S	9	4 47 4	159 3 16	3
		9	6	2 41	5
40	S	10	4 47 8	161 15 55	16
41	S	7	4 47 6	158 50 47	∫
		8	13	51 39	5
42	S	10′	4 47 10	156 25 ..	∫
43	S	10	4 47 17	157 49 15	32
44	S	9′	4 47 19	157 27 15	32
		10	20	27 44	∫
45	S	9	4 47 21	160 26 43	15
46	S	10	4 47 24	157 30 15	32
	..	10	26	30 44	∫
47	S	9′	4 47 24	156 28 6	∫
	..	10	28	26 54	13
48	S	9	4 47 38	157 33 15	32
	..	9′	40	32 39	∫
49	S	9	4 47 56	157 27 45	32
	..	9′	61	27 48	∫

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
50	S	9	4 47 58	156 45 54	13
51	S	8	4 48 27	161 24 55	16
52	N		4 48 33	159 38 20	∫
53	S	9	4 48 35	159 4 7	5
		9	37	4 16	3
54	S	10′	4 48 39	157 5 15	32
55	N		4 48 41	159 40 10	∫
56	S	10′	4 48 41	157 3 15	32
57	S	10′	4 48 45	157 8 45	32
58	S	9	4 48 50	156 51 54	13
59	N		4 48 51	158 30 31	∫
60	S	10	4 49 2	160 25 13	15
61	S	10	4 49 4	157 7 15	32
62	S	7′	4 49 7	158 0 27	∫
		7′	8	0 15	32
		7′	13	0 35	5
63	N	I.	4 49 8	158 50 35	∫
64	S	10	4 49 13	156 13 24	13
65	N	I.	4 49 51	159 23 46	∫
66	S	8′	4 50 21	160 32 13	15
67	S	10	4 50 31	159 59 16	3
68	S	10	4 50 31	161 17 25	16
69	N	III.	4 50 40	160 8 32	∫
70	N		4 50 56	160 3 16	3
	N	II.	66	2 14	∫
71	S	10	4 51 5	159 57 16	3
72	S	7	4 51 41	158 20 46	∫
..	..	7′	44	21 32	5
73	N		4 51 52	160 14 43	15
	N	I.	59	15 57	∫
74	S	8	4 51 55	160 6 43	15
		6′	58	6 49	∫
75	N	I.	4 51 57	159 42 46	∫
76	S	9′	4 51 59	158 23 1	5
77	N	I.	4 51 59	157 11 51	∫
78	N	III.	4 52 1	157 10 44	∫
79	N	II.	4 52 20	157 19 38	∫
80	S	9	4 52 41	158 21 41	∫
81	N	II.	4 52 53	159 40 6	∫
..	N		53	40 16	3
82	N		4 53 12	159 37 1	∫
	N		12	37 16	3
83	S	7	4 53 14	156 56 41	∫
		7	15	24	13
		6′	18	57 15	32
84	C	9	4 53 21	157 11 29	∫
85	S	8	4 53 25	159 41 5	∫
	..	8′	26	40 16	3
	..	8′	27	40 15	9
86	S	9′	4 53 31	160 20 13	15
87	N	III.	4 53 47	156 56 36	∫
88	N	III.	4 53 50	158 55 15	∫
89	S	10	4 54 8	160 40 43	15
90	S	10	4 54 10	161 47 25	16
91	N	I.	4 54 16	159 2 8	∫
92	N	II.	4 54 18	157 21 47	∫
93	N	I.	4 54 23	158 20 11	∫
94	S	10	4 54 34	158 33 28	5
95	N	III.	4 54 42	159 27 —	∫
96	S	9	4 54 55	161 49 55	16
97	N		4 54 59	159 25 16	3
	N		60	28 7	∫
	N		61	29 15	9
98	S	10	4 55 10	159 26 16	3
	N	II.	18	26 —	∫

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
99	Cl	VI.	4 55 13	157 26 20	/
100	N	III.	4 55 21	158 27 14	f
101	N	II.	4 55 24	159 27 54	f
102	S	9	4 55 29	159 46 15	9
103	N	III.	4 55 33	160 4 47	f
104	S	10	4 55 40	160 38 43	15
105	N	I.	4 55 41	158 28 29	f
	N		44	29 7	5
106	N	III.	4 55 48	159 30 9	f
107	S	10	4 55 52	160 17 13	15
108	N	II.	4 55 54	160 42 37	f
109	S	10	4 56 6	156 52 54	13
110	N		4 56 13	156 46 38	—
111	Cl	VI.	4 56 16	156 43 50	/
112	N		4 56 25	156 40 54	13
	N		29	39 58	f
113	S	9	4 56 42	158 36 23	5
114	N	III.	4 56 45	157 57 23	f
115	S	10	4 56 46	160 12 43	15
116	S	10	4 56 49	160 17 13	15
117	S	9′	4 56 57	160 29 13	15
118	S	9	4 57 0	160 32 43	15
119	S	9	4 57 11	161 59 55	16
120	S	9′	4 57 25	159 5 15	9
121	N	I.	4 57 27	156 42 38	f
	N		29	42 54	13
122	N	II.	4 57 28	158 30 47	f
123	N		4 57 31	159 39 15	9
124	N		4 57 31	160 29 0	f
125	S	10	4 57 34	156 22 54	13
126	S	9	4 57 43	161 33 55	16
127	N		4 57 47	156 36 41	f
128	C		4 57 51	158 40 24	f
	C		53	40 21	5
129	S	9′	4 57 53	156 29 54	13
130	N		4 58 0	159 50 15	9
	N	II.	1	48 44	f
131	N	I.	4 58 12	157 29 47	f
132	S	9	4 58 18	159 6 45	9
133	N		4 58 20	156 40 41	f
134	S	10′	4 58 22	159 54 15	9
135	S	9	4 58 24	161 3 43:	15
		8	28	2 25	16
136	S	9′	4 58 34	156 26 54	13
137	S	9	4 58 35	159 14 15	9
138	N	III.	4 58 36	160 41 7	f
139	N	I.	4 58 39	156 14 16	f
140	S	9′	4 58 39	156 58 24	13
141	S	10	4 58 42	157 19 33	12
142	S	6′	4 58 48	161 9 55	16
143	S	10′	4 58 49	159 55 15	9
144	N	I.	4 58 55	159 38 56	f
	N		59	39 15	9
	N		59	38 15	9
145	S	10	4 59 5	161 51 55	16
146	S	9	4 59 21	159 19 15	9
147	N		4 59 21	159 6 15	9
148	N	I.	4 59 24	157 59 40	f
149	S	8′	4 59 38	160 24 13	15
150	C	VII.	4 59 47	156 5 15	f
151	S	9	5 0 2	156 14 54	13
152	S	10	5 0 29	156 34 54	13
153	S	8	5 0 36	158 49 19	5
154	N	III.	5 0 36	160 24 25	f
155	N	II.	5 0 49	159 47 57	f
156	S	9	5 1 1	159 8 15	9
157	N	II.	5 1 13	160 2 12	f
158	S	9′	5 1 25	157 40 33	12
159	S	8′	5 1 33	159 35 15	9
160	S	10	5 1 34	161 6 25	16
161	S	10	5 1 44	160 42 13	15
162	N	II.	5 1 47	159 51 0	f
163	S	10	5 1 53	160 42 13	15

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
164	N		5 1 57	156 21 54	13
	N	I.	58	20 35	f
165	S	8	5 1 57	158 16 18	f
	..	9	64	16 16	5
166	N	II.	5 2 2	159 19 27	f
167	S	9′	5 2 13	156 55 54	13
168	S	9	5 2 14	160 55 43	15
169	S	8	5 2 19	160 52 43	15
	..	8	29	51 40	f
170	N	II.	5 2 36	158 13 47	f
171	S	9′	5 2 40	159 13 15	9
172	S	7′	5 2 43	159 44 15	9
	..	7′	45	43 40	f
173	S	9	5 3 0	158 5 33	12
	..	8	1	4 42	f
174	S	9	5 3 5	157 8 33	12
175	S	10	5 3 6	160 54 43	15
176	S	8	5 3 6	159 6 14	5
177	S	9′	5 3 6	160 16 43	15
178	N	III.	5 3 6	156 36 43	f
179	N	II.	5 3 18	159 51 40	f
180	S	10	5 3 21	156 51 54	13
181	S	9′	5 3 24	159 27 45	9
182	S	9	5 3 45	158 45 11	5
183	N	III.	5 3 57	157 32 7	f
184	N		5 3 58	156 39 54	13
	N	I.	60	39 29	f
185	N	III.	5 4 0	157 29 28	f
186	S	9′	5 4 9	155 59 24	13
187	N	III.	5 4 12	160 33 10	f
188	N	II.	5 4 15	160 51 10	f
189	S	10	5 4 21	161 34 25	16
190	C	VI.	5 4 24	157 29 13	f
191	N	III.	5 4 45	156 26 10	f
192	S	9′	5 4 54	160 40 43	15
193	S	5′	5 4 56	161 32 46	f
	..	6	59	32 55	16
194	S	10	5 5 1	156 56 54	13
195	S	7′	5 5 1	162 5 55	16
196	N	III.	5 5 7	156 27 20	f
197	Cl	II.	5 5 10	160 34 17	f
198	S	9	5 5 10	159 59 15	9
	..	10	10	59 13	15
199	N		5 5 12	159 10 15	9
200	N	II.	5 5 28	158 16 37	f
201	N	II.	5 5 29	159 36 43	f
202	S	7′	5 5 36	158 19 10	5
	..	8	39	18 27	f
203	S	8	5 5 40	159 8 15	9
	..	8	44	8 5	5
204	S	10	5 5 45	161 37 55	16
205	N	II.	5 5 46	159 34 7	f
206	S	9′	5 5 51	160 53 43	15
207	S	9	5 5 55	159 24 45	9
208	S	8	5 5 59	156 11 24	13
209	S	9	5 6 7	159 56 15	9
210	N		5 6 14	159 39 15	9
	N	I.	16	37 35	f
211	N	I.	5 6 15	159 26 17	f
212	N	III.	5 6 17	160 57 27	f
213	S	9′	5 6 20	160 48 43	15
214	N		5 6 21	158 51 1	f
215	S	9	5 6 28	158 7 35	5
216	N		5 6 36	160 56 43	15
	N		43	56 16	f
217	S	8	5 6 38	158 37 4	5
	C	VII.	40	39 48	f
218	S	10	5 6 43	160 25 43	15
219	S	10	5 6 43	160 32 43	15
220	C	VI.	5 6 43	160 56 16	f
221	N	II.	5 6 47	158 50 57	f
222	S	10	5 7 6	160 6 43	15
223	N	II.	5 7:13	161 58 28	f

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
224	N	III.	5 7 23	157 29 33	ʃ
225	N	II.	5 7 39	157 32 13	ʃ
226	S	10	5 7 43	161 32 55	16
227	S	8′	5 7 46	160 54 43	15
		8	52	54 9	17
228	S	10	5 7 46	160 15 43	15
229	N	II.	5 7 48	157 40 14	ʃ
230	S	8	5 7 56	159 22 15	9
231	S	9	5 7 56	160 48 43	15
		9	61	48 39	17
	Cl	9	68	48 55	ʃ
232	S	10	5 8 1	161 16 55	16
233	N	I.	5 8 7	159 11 10	ʃ
234	S	9′	5 8 10	160 19 39	17
		9′	13	19 43	15
235	C		5 8 29	161 24 8	ʃ
236	S	9′	5 8 52	156 24 54	13
237	S	10	5 8 55	157 23 3	12
238	S	9′	5 9 3	158 41 31	5
239	N	III.	5 9 18	156 30 56	ʃ
240	S	7	5 9 22	161 28 55	16
241	S	10	5 9 27	161 24 25	16
242	N	I.	5 9 35	158 57 59	ʃ
	N		38	59 0	5
243	S	10	5 9 35	161 20 55	16
244	N	II.	5 9 46	157 59 10	ʃ
245	S	8	5 9 51	156 37 24	13
	..	8′	52	37 56	ʃ
246	N		5 10 7	159 5 15	9
	N	I.	12	3 23	ʃ
247	N		5 10 16	159 2 25	5
	Cl		18	2 49	ʃ
248	S	9	5 10 24	159 23 15	9
249	N		5 10 24	159 20 15	9
	N	I.	32	20 9	ʃ
250	S	7′	5 10 42	159 55 39	17
	..	8	45	56 15	9
	..	8	50	55 17	ʃ
251	N		5 10 46	159 6 15	9
	N	I.	47	5 53	ʃ
	N		55	6 53	5
252	S	9	5 11 11	156 53 54	13
253	S	9′	5 11 27	160 46 9	17
254	N	II.	5 11 31	158 57 45	ʃ
255	S	8′	5 11 32	159 30 15	9
256	S	9′	5 11 47	160 40 9	17
257	S	10	5 11 50	160 23 9	17
258	S	10	5 11 58	161 35 55	16
259	N	III.	5 12 3	156 20 50	ʃ
260	N	III.	5 12 23	160 59 2	ʃ
261	N	I.	5 12 28	158 55 27	ʃ
262	S	9	5 12 36	157 46 1	ʃ
263	S	8	5 12 43	159 44 17	ʃ
	..	8	44	45 15	9
	..	8	49	43 48	10
264	S	9′	5 12 48	158 9 51	5
265	N	II.	5 13 0	157 49 18	ʃ
266	S	10	5 13 1	156 24 54	13
267	S	10	5 13 10	160 38 9	17
268	S	9′	5 13 15	157 54 33	12
269	N	III.	5 13 16	158 57 40	ʃ
270	S	10	5 13 19	161 21 55	16
271	S	9′	5 13 21	160 34 39	17
272	N	III.	5 13 25	156 29 6	ʃ
273	S	10	5 13 29	156 31 54	13
274	S	6	5 13 44	157 23 3	12
		5′	48	22 55	22
		5′	49	23 2	19
		5′	50	22 54	13
		..	55	23 4	28
		5′	55	22 35	14
	C	5′	55	22 33	ʃ
			☞		

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
		6	56	22 33	12
		5′	59	22 55	21
		5	59	23 39	17
		5′	65	23 13	15
275	S	9′	5 13 49	157 46 3	12
276	C	VII.	5 14 1	157 34 7	ʃ
277	S	8	5 14 5	158 12 49	5
278	C		5 14 9	157 38 46	ʃ
279	N	I.	5 14 11	159 17 30	ʃ
280	C		5 14 11	157 31 23	ʃ
281	N		5 14 14	159 31 15	9
	N	II.	20	30 12	ʃ
282	N	II.	5 14 23	159 33 55	ʃ
283	N	I.	5 14 29	159 33 1	ʃ
284	N	III.	5 14 32	159 34 1	—
285	S	9′	5 14 45	159 11 15	9
286	N	III.	5 14 46	160 39 52	ʃ
287	S	9′	5 14 49	159 45 15	9
	..	9′	56	43 18	10
288	S	10	5 14 52	159 32 15	9
289	N	..	5 14 52	159 33 46	—
290	S	10	5 14 53	159 31 0	—
		10	65	30 48	10
291	S	10	5 14 57	159 27 48	10
292	S	10	5 14 59	159 43 38	10
293	S	10	5 15 2	161 18 25	16
294	S	10	5 15 10	159 22 18	10
295	S	7′	5 15 11	161 14 25	16
296	N	II.	5 15 13	156 18 51	ʃ
297	N		5 15 16	159 29 0	—
298	S	10	5 15 20	159 44 18	10
299	S	10	5 15 33	159 43 43	10
300	S	10	5 15 39	159 23 18	10
301	N	III.	5 15 42	156 20 41	ʃ
302	N	III.	5 15 52	156 30 11	ʃ
303	S	10	5 15 53	156 44 54	13
304	S	10	5 15 57	159 22 38	10
305	S	9	5 15 58	160 8 9	17
			63	8 12	ʃ
306	N	II.	5 15 58	159 9 21	ʃ
307	S	9′	5 16 6	159 2 15	9
	..	9′	22	0 18	10
308	S	9	5 16 10	157 14 27	5
309	S	9	5 16 10	159 49 18	10
310	S	8	5 16 17	160 46 9	17
311	S	9′	5 16 32	160 27 39	17
312	S	8	5 16 45	161 41 55	16
313	S	9	5 17 4	157 43 33	12
314	N		5 17 5	159 37 48	10
	N	II.	10	38 35	ʃ
315	N	II.	5 17 6	157 30 29	ʃ
316	S	10	5 17 13	160 13 39	17
317	S	9′	5 17 17	159 29 18	10
318	S	9′	5 17 21	158 21 45	5
319	S	10	5 17 34	158 19 39	5
320	S	7′	5 17 43	160 38 39	17
321	N	III.	5 17 47	157 37 11	ʃ
322	S	10	5 17:47	159 2 48	10
323	S	9′	5 17 48	158 18 7	5
324	S	10	5 17 49	159 57 18	10
325	S	9	5 17 52	159 13 18	10
326	N	II.	5 18 4	158 2 57	ʃ
327	N	II.	5 18 6	159 49 35	ʃ
328	S	9′	5 18 8	158 39 5	5
	..	8′	12	38 32	19
329	S	10	5 18 14	159 56 18	10
330	N	I.	5 18 14	156 47 50	ʃ
331	S	9	5 18 17	159 45 18	10
332	C	7	5 18 17	158 45 56	ʃ
	S	8′	25	46 34	5
	S	8	33	46 2	19
333	S	10	5 18 32	156 58 54	13

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
334	N		5 18 33	159 30 18	10
	N	I.	35	30 29	ſ
335	S	10	5 18 43	159 56 18	10
336	S	9	5 18 47	158 31 2	5
		9	58	31 32	19
337	S	10	5 18 48	158 41 32	19
338	S	8	5 18 51	160 25 39	17
339	S	9	5 18 52	158 38 30	5
		8′	52	38 2	19
340	S	10	5 19 10	160 0 18	10
341	S	10	5 19 11	158 38 2	19
342	S	10	5 19 14	161 6 55	16
343	N	II.	5 19 14	156 55 51	ſ
344	S	9′	5 19 17	156 9 54	13
345	Cl	VII.	5 19 23	159 23 18	ſ
	S	9	31	23 18	10
	N		43	23 18	10
346	S	10	5 19 23	159 54 18	10
347	S	10	5 19 23	158 12 32	19
348	S	10	5 19 31	159 20 18	10
349	S	9	5 19 34	159 25 18	10
350	N	III.	5 19 37	156 58 8	ſ
351	S	9′	5 19 38	158 43 32	19
352	S	8′	5 19 41	156 36 54	13
	..	8′	52	36 5	14
353	S	7′	5 19 42	156 13 54	13
	..	7′	51	12 35	14
354	S	9	5 19 43	159 31 18	10
355	S	10	5 19 43	156 25 24	13
356	N		5 19 48	159 43 18	10
357	S	9′	5 19 49	158 2 2	19
358	N	I.	5 19 53	159 34 33	ſ
	N		55	35 18	10
359	S	9′	5 19 51	156 46 54	13
360	S	9	5 19 57	158 44 32	19
361	S	8	5 19 57	161 42 25	16
362	S	10	5 19 58	158 35 32	19
363	N	III.	5 20 1	161 25 29	ſ
364	S	9′	5 20 1	158 55 32	19
365	N	III.	5 20 5	159 10 0	ſ
366	S	10	5 20 10	158 3 2	19
367	C	VI.	5 20 16	157 2 41	ſ
368	S	10	5 20 18	157 18 3	12
369	N		5 20 25	159 48 18	10
370	S	10	5 20 33	159 48 18	10
371	N	II.	5 20 33	156 56 28	ſ
372	S	10	5 20 36	158 7 32	19
373	N	III.	5 20 50	159 56 52	ſ
374	N		5 21 7	159 38 18	10
375	C	VIII.	5 21 19	156 1 58	ſ
376	S	10	5 21 27	159 11 18	10
377	S	8	5 21 33	158 8 2	19
378	S	11	5 21 35	159 38 18	10
379	S	9	5 21 51	158 31 32	19
380	N	II.	5 21 55	159 41 32	ſ
381	S	11	5 21 57	159 38 18	10
382	S	9′	5 21 58	159 25 18	10
383	S	8′	5 22 2	160 54 39	17
	..	8′	11	53 58	18
384	N		5 22 8	158 5 13	ſ
385	S	9′	5 22 13	161 55 55	16
386	N	II.	5 22 13	156 18 7	ſ
387	N	I.	5 22 16	159 38 40	ſ
388	S	8	5 22 27	161 7 25	16
389	N	..	5 22 27	158 4 31	—
390	S	10	5 22 27	159 37 48	10
	..	10	28	36 44	11
	..	10	33	37 14	11
391	S	10	5 22 28	161 37 55	16
392	N	II.	5 22 31	158 6 58	ſ
393	S	10	5 22 40	159 37 44	11
394	S	10	5 22 40	159 35 44	11
395	S	9′	5 22 41	158 46 32	19
396	S	8′	5 22 45	158 13 32	19
397	S	10	5 22 46	159 36 14	11
398	N		5 22 48	158 8 0	ſ
	N		50	8 2	19
399	N	III.	5 22 50	158 3 27	—
400	S	9′	5 22 51	157 29 33	12
401	S	9′	5 22 54	161 42 55	16
402	N	III.	5 22 54	156 32 10	ſ
403	S	10′	5 22 57	158 1 32	19
404	N	II.	5 22 57	157 20 24	ſ
405	N	II.	5 23 2	160 6 17	ſ
406	S	10	5 23 3	156 34 35	14
407	S	7′	5 23 13	160 1 19	25
408	S	10	5 23 22	160 6 58	18
409	S	10	5 23 38	159 55 44	11
410	S	9′	5 23 41	160 43 28	18
411	S	8′	5 23 41	158 13 32	19
412	S	10	5 23 43	158 2 32	19
413	S	9′	5 23 46	158 59 2	19
414	S	10	5 23 56	156 32 5	14
415	N	II.	5 24 12	160 18 24	ſ
416	S	10′	5 24 15	160 23 58	18
417	N	III.	5 24 47	156 36 16	ſ
418	S	7	5 24 51	161 39 55	16
419	S	10	5 24 52	156 59 35	14
420	S	9′	5 24 59	159 38 44	11
421	N	II.	5 25 7	156 32 1	ſ
422	S	9	5 25 11	158 1 33	12
	..	8	14	2 32	19
423	S	8	5 25 16	156 24 35	14
	C	..	39	24 36	ſ
424	S	10	5 25 23	160 15 58	18
425	S	10′	5 25 33	158 43 32	19
426	S	7	5 25 37	158 8 32	19
427	S	10	5 25 41	161 13 55	16
428	S	10	5 25 51	157 55 33	12
429	N	II.	5 25 56	158 37 2	ſ
430	S	8	5 26 0	156 35 5	14
431	N	I.	5 26 4	156 44 0	ſ
	N		8	45 5	14
432	N	I.	5 26 7	160 2 53	ſ
433	S	10	5 26 23	159 23 44	11
434	S	10	5 26 24	157 40 33	12
435	N	II.	5 26 28	158 58 31	ſ
436	N		5 26 30	157 37 33	12
	C		26 35	38 50	ſ
437	S	10	5 26 34	161 17 55	16
438	S	10	5 26 47	159 29 44	11
439	S	10	5 26 50	159 31 44	11
440	S	9′	5 26 51	159 45 14	11
		9	64	45 33	20
441	S	10	5 26 55	157 57 33	12
442	N	II.	5 27 3	159 58 50	ſ
	N		5	58 44	11
443	S	10′	5 27 7	159 12 44	11
444	S	10′	5 27 11	159 12 14	11
	S.δ	10	18	13 33	20
445	N	III.	5 27 7	160 4 19	ſ
446	N	III.	5 27 10	158 58 34	ſ
447	S	10	5 27 13	158 14 32	19
448	N	III.	5 27 27	158 56 52	ſ
449	N	II.	5 27 36	158 57 3	ſ
450	S	10	5 27 41	158 58 32	19
	Cl	*	47	57 34	ſ
451	N		5 27 43	157 34 33	12
	Cl		48	35 34	ſ
452	N		5 27 45	158 58 ..	ſ
453	S	6	5 27 46	158 45 32	19
		..	54	45 19	ſ
		..	54	45 33	20
		6	59	44 59	21
454	S	10	5 27 49	159 35 33	20
455	S	11	5 27 49	158 58 42	19

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.	No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
456	N		5 27 50	159 13 44	11	505	N		5 31 26	157 4 25	22
	N		61	13 33	20		C		28	5 23	∫
457	S	10	5 27 57	158 37 32	19		N		30	4 3	12
458	N	III.	5 28 3	159 59 4	∫	506	S	9′	5 31 31	160 23 28	18
459	S	9	5 28 7	157 44 3	12	507	S	9	5 31 35	159 54 33	20
		9,	13	43 33	12		—	9,	41	54 33	20
		8′	17	42 25	22	508	S	8′	5 31 37	160 5 58	18
460	N		5 28 9	159 58 44	11	509	N		5 31 39	159 52 33	20
	N		16	58 44	11	510	S	8′	5 31 39	156 48 5	14
	N	II.	18	59 49	∫	511	S	9′	5 31 44	158 13 52	19
461	S	9′	5 28 11	161 6 25	16	512	S	10	5 31 45	159 27 33	20
462	S	9′	5 28 12	156 40 5	14	513	S	10′	5 31 49	159 15 43	20
463	N	III.	5 28 19	159 58 59	∫	514	S	9′	5 31 55	156 28 5	14
464	S	8	5 28 19	160 12 28	18	515	S	9,	5 32 0	159 10 33	20
	..	8′	24	11 55	∫		—	10′	7	10 33	20
465	S	8	5 28 21	158 11 32	19	516	S	10	5 32 5	157 34 25	22
466	N		5 28 32	156 21 35	14	517	S	10	5 32 6	156 0 35	14
	N	I.	33	21 41	∫	518	S	10	5 32 9	159 40 33	20
467	S	10′	5 28 42	159 34 33	20			10	14	40 3	20
468	N		5 28 44	159 16 44	11	519	N		5 32 11	159 16 33	20
	C		50	15 33	20		N	II.	12	18 7	∫
	C		52	15 35	∫	520	S	9,	5 32 12	160 18 28	18
469	C		5 28 45	159 7 44	11	521	S	9′	5 32 24	157 55 33	12
	C		51	7 12	∫			9	29	55 25	22
470	S	10	5 28 47	157 59 33	12			9,	34	55 25	22
		8′	53	60 32	19	522	S	8′	5 32 24	160 56 8	18
471	S	9	5 28 47	160 52 28	18			8	25	55 55	16
472	S	10	5 28 55	159 20 44	11	523	N	II.	5 32 39	160 57 12	∫
473	S	8	5 29 7	156 48 35	14	524	S	9′	5 32 45	157 11 25	22
474	S	8	5 29 13	156 45 5	14			9′	49	11 25	22
475	N	I.	5 29 15	160 6 19	∫	525	N	I.	5 32 45	157 38 13	∫
476	C		5 29 17	157 33 42	∫	526	S	10	5 32 47	158 38 29	21
477	S	7′	5 29 20	156 33 56	∫	527	S	9,	5 32 48	156 29 5	14
	..	7′	23	33 5	14	528	S	9′	5 32 52	157 47 25	22
478	N	II.	5 29 22	160 52 15	∫		C	VI.	53	48 36	∫
479	S	9′	5 29 24	158 10 2	19	529	S	8	5 33 2	161 2 41	23
480	N		5 29 27	159 16 44	11			7	3	3 25	16
	C	VII.	34	16 22	∫	530	Cl	VII.	5 33 5	159 22 38	∫
	S	10	39	15 33	20	531	S	10	5 33 10	161 32 11	23
481	S	10	5 29 29	160 39 20	18	532	S	10	5 33 11	161 20 11	23
482	S	10	5 29 30	159 2 44	11	533	N	II.	5 33 15	160 4 17	∫
483	S	10	5 29 34	158 56 32	19	534	S	9′	5 33 15	159 16 33	20
484	S	9	5 29 34	160 5 14	11	535	N		5 33 33	160 16 28	18
485	S	10	5 29 37	156 9 5	14		N	I.	48	16 3	∫
486	S	8′	5 29 50	161 20 55	16	536	N		5 33 36	161 11 11	23
487	S	10	5 29 55	160 3 28	18		N	II.	41	11 30	∫
488	Cl		5 30 2	158 52 15	∫	537	N	II.	5 33 37	157 49 26	∫
489	N	II.	5 30 15	161 59 55	∫	538	N		5 33 42	157 36 25	22
490	S	9	5 30 26	157 51 25	22		N	II.	53	34 7	∫
	—	9,	30	50 33	12	539	S	9,	5 33 43	159 20 33	20
491	S	9′	5 30 26	156 42 35	14	540	S	10′	5 33 58	158 22 29	21
492	N	*	5 30 26	157 0 3	12	541	S	10	5 34 2	160 39 58	18
	N	I.	27	0 31	∫	542	S	9′	5 34 9	157 7 25	22
	N		29	1 5	14	543	S	10	5 34 14	158 40 29	21
493	S	8	5 30 28	161 13 55	16			10	17	40 59	21
494	S	9,	5 30 32	158 60 32	19	544	S	9′	5 34 26	157 26 55	22
		9′	34	59 33	20	545	S	9′	5 34 29	157 20 25	22
495	S	9	5 30 39	158 22 32	19	546	S	8′	5 34 30	158 3 29	21
496	S	8	5 30 41	161 2 55	16	547	S	9,	5 34 38	157 6 25	22
497	S	9,	5 30 44	156 40 5	14	548	S	9′	5 34 44	160 47 28	18
498	S	9′	5 30 47	158 3 32	19	549	S	10	5 34 44	157 23 25	22
499	N	II.	5 30 49	156 35 25	∫	550	S	10	5 34 49	157 4 25	22
	N		54	35 35	14	551	S	8′	5 34 56	157 0 25	22
500	S	10	5 30 53	159 34 33	20		Cl	VI.	65	0 20	∫
501	N		5 30 54	157 24 33	12	552	S	10	5 34 56	157 14 25	22
	N	I.	58	24 35	∫	553	S	10	5 34 58	157 3 25	22
	N		58	24 55	22	554	S	10	5 35 6	157 27 25	22
502	S	9	5 31 11	158 13 32	19	555	S	10′	5 35 10	158 6 29	21
	—	9	19	13 29	21	556	S	10	5 35 11	156 59 55	22
503	S	10	5 31 12	158 6 32	19	557	S	10	5 35 11	157 27 5	22
504	S	6′	5 31 15	160 55 55	16	558	S	10	5 35 15	158 20 9	21
	—	8	19	56 28	18	559	S	10	5 35 17	157 7 25	22

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
560	N	I.	5 35 17	161 48 30	ʃ
561	S	8′	5 35 20	157 34 25	22
562	S	10	5 35 24	159 53 33	20
563	Cl	VI.	5 35 24	156 7 55	ʃ
564	N	II.	5 35 25	157 39 48	ʃ
565	S	10	5 35 27	158 20 29	21
566	S	10′	5 35 27	159 20 33	20
567	S	7′	5 35 28	158 18 29	21
568	N	III.	5 35 39	160 3 32	ʃ
569	S	10	5 35 39	160 34 58	18
570	S	10	5 35 42	160 31 58	18
571	N	I.	5 35 45	157 40 51	ʃ
	N		46	40 25	22
572	S	10	5 35 51	158 51 29	21
573	S	10	5 35 52	158 25 29	21
574	Cl	VI.	5 35 54	156 59 46	ʃ
575	N		5 35 55	161 5 41	22
	N	I.	58	6 27	ʃ
576	N	I.	5 35 58	157 41 24	ʃ
577	S	10	5 36 2	157 9 25	22
578	S	8	5 36 2	159 34 33	20
579	Cl	11	5 36 2	159 53 33	20
580	S	10′	5 36 4	157 45 25	22
581	S	9′	5 36 5	157 59 25	22
	S	9	22	60 29	21
582	S	10	5 36 7	156 57 25	22
583	N	III.	5 36 10	160 : 9 42	ʃ
584	S	8′	5 36 11	156 24 5	14
585	S	10	5 36 13	157 9 55	22
586	S	10	5 36 16	156 46 35	14
587	S	10	5 36 16	157 49 25	22
588	S	10	5 36 24	157 43 25	22
589	S	9	36 26	160 35 8	18
590	S	9′	36 26	158 37 29	21
591	N	II.	5 36 33	157 40 5	ʃ
592	S	8	5 36 34	160 16 7	ʃ
	—	8	35	28	18
593	C	8	5 36 35	159 52 33	20
594	N		5 36 36	157 5 25	22
	N	I.	38	5 25	ʃ
595	S	10	5 36 38	159 47 3	20
596	S	10′	5 36 43	157 35 25	22
597	S	10	5 36 44	159 7 33	20
598	S	10′	5 36 44	158 23 59	21
599	N	I.	5 36 45	160 39 25	ʃ
600	S	10	5 36 48	156 51 35	14
601	S	6	5 36 50	156 39 35	14
	—	6	54	39 36	ʃ
	—	7	55	39 54	13
602	S	8′	5 36 53	161 2 41	23
603	S	10	5 37 0	157 35 55	22
604	S	10	5 37 6	156 53 5	14
605	C	9	5 37 13	159 1 18	ʃ
	S	9	15	2 3	20
606	S	9	5 37 14	159 36 33	20
607	S	10	5 37 19	157 9 25	22
608	C		5 37 21	159 18 33	20
609	S	8′	5 37 22	160 35 28	18
610	S	9	5 37 29	159 31 3	20
611	N	III.	5 37 30	160 20 0	ʃ
612	S	8	5 37 31	161 50 11	23
613	S	10′	5 37 34	158 13 59	21
614	S	9′	5 37 34	159 0 33	20
		10	39	0 29	21
615	S	7	5 37 36	161 13 41	23
616	S	11	5 37 37	159 28 33	20
617	S	11	5 37 39	159 29 33	20
618	S	10	5 37 45	158 13 29	21
619	N		5 37 46	160 17 15	ʃ
620	S	10′	5 37 47	158 42 29	21
621	N	III.	5 37 51	159 42 40	
622	S	9	5 37 53	158 50 59	21

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
623	S	8	5 37 55	158 57 33	20
	—	10	59	57 29	21
624	S	7′	5 37 59	161 46 11	23
625	S	10′	5 38 3	159 35 33	20
626	S	10′	5 38 3	161 12 11	23
627	N	II.	5 38 8	157 31 6	ʃ
628	C	VI.	5 38 9	159 29 10	
629	N	V.	5 38 20	159 53 10	
630	S	10	5 38 20	160 23 28	18
631	S	10	5 38 21	158 4 29	21
632	S	9	5 38 26	158 30 29	21
633	S	8′	5 38 26	158 48 29	21
634	S	10	5 38 26	160 49 48	18
635	N	II.	5 38 27	161 6 20	ʃ
636	Cl	VI.	5 38 29	159 30 57	ʃ
637	N		5 38 38	160 15 28	18
	N	I.	43	15 21	ʃ
638	N	II.	5 38 41	160 46 13	ʃ
639	N	II.	5 38 44	160 21 38	ʃ
640	N	III.	5 38 46	160 13 24	ʃ
641	S	8′	5 38 48	157 16 25	22
642	N		5 38 56	159 15 33	20
643	S	9	5 38 56	158 30 59	21
644	N	III.	5 38 59	156 57 46	ʃ
645	S	9	5 39 4	158 50 29	21
646	S	10	5 39 14	159 12 3	20
647	S	11	5 39 25	158 55 29	21
648	N		5 39 28	160 20 28	18
	N	I.	30	19 22	ʃ
649	S	8	5 39 31	160 30 28	18
		8	36	30 19	25
650	S	9	5 39 34	160 46 28	18
	S	9	37	46 19	25
651	S	7′	5 39 37	160 2 58	18
		7′	37	3 19	25
652	S	10	5 39 42	158 58 29	21
653	S	8	5 39 46	157 6 25	22
654	N	V	5 39 50	159 5 37	ʃ
655	N	V	5 39 50	159 11 29	21
			52	10 53	30
			53	11 12	ʃ
			55	11 33	20
			55	11 13	24
656	S	10′	5 39 59	159 22 13	24
657	S	9′	5 40 1	157 0 25	22
		9	9	0 35	14
658	S	10′	5 40 5	159 6 43	24
659	S	10′	5 40 6	159 13 13	24
660	S	10	5 40 9	160 33 19	25
661	S	10′	5 40 10	159 32 13	24
662	S	9′	5 40 11	156 58 25	22
		9	18	59 5	14
		10	18	60 0:	27
663	S	10	5 40 13	159 34 43	24
664	N	II.	5 40 16	159 34 28	
665	S	10	5 40 20	159 34 13	24
666	S	10	5 40 21	158 0 29	21
667	S	9	5 40 22	159 49 13	24
668	N		5 40 23	160 46 19	25
	N	I.	31	46 13	ʃ
669	S	10	5 40 37	160 49 49	25
670	S	10′	5 40 37	159 17 13	24
671	S	10′	5 40 40	159 1 13	24
672	S	8	5 40 45	161 45 11	23
673	S	10′	5 40 51	159 32 43	24
674	S	9	5 40 55	161 22 11	23
675	S	10′	5 40 57	161 48 11	23
676	S	9′	5 41 1	158 29 59	21
677	S	9′	5 41 5	158 49 29	21
678	N	III.	5 41 6	159 44 39	—
679	S	10	5 41 6	157 12 25	22
	—	10	7	11 55	22

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
680	N		5 41 10	159 49 43	—
681	N		5 41 11	159 51 33	ʃ
	N		15	51 13	24
682	N		5 41 12	159 44 13	24
	N	I.	13	44 13	ʃ
683	S	9	5 41 23	158 20 29	21
684	C	VI.	5 41 25	159 29 10	—
685	N		5 41 28	159 49 14	ʃ
686	N		5 41 32	159 50 41	ʃ
687	S	8	5 41 33	161 43 41	23
688	N		5 41 35	159 45 47	—
689	S	10	5 41 39	159 45 43	24
690	S	10	5 41 41	156 44 30	27
691	S	10	5 41 42	159 35 13	24
692	S	9	5 41 42	159 1 13	24
693	S	10′	5 41 43	159 35 53	24
694	S	10	5 41 45	158 54 29	21
695	S	8′	5 41 48	156 8 0	27
696	N	II.	5 41 49	158 32 32	ʃ
697	N	III.	5 41 50	159 45 19	—
698	S	9	5 41 55	159 56 13	24
699	S	7	5 42 3	157 28 25	22
	—	7	7	28 42	ʃ
700	S	9′	5 42 4	159 14 43	24
701	S	8′	5 42 4	159 58 19	25
702	S	10′	5 42 10	159 47 13	24
703	S	10	5 42 10	159 21 13	24
704	S	10′	5 42 11	159 34 13	24
705	S	9	5 42 11	160 26 19	25
706	S	7	5 42 17	158 50 29	21
	—	7	17	50 51	ʃ
	—	7	17	50 36	26
707	N	III.	5 42 20	159 31 55	
708	N	III.	5 42 32	158 26 25	ʃ
709	S	9	5 42 33	158 57 29	21
710	N	III.	5 42 43	159 19 33	
711	S	10	5 42 48	159 40 13	24
712	S	10	5 42 50	156 35 0	27
713	S	10	5 42 51	157 15 25	22
714	N	III.	5 42 52	159 17 20	
715	Cl	9	5 42 53	157 24 56	ʃ
716	N	III.	5 42 55	159 0 4	ʃ
717	S	7	5 42 56	157 12 55	22
	—	8	58	12 43	ʃ
718	S	10	5 42 57	161 18 11	23
719	S	10	5 42 58	159 52 43	24
720	S	8	5 43 4	158 31 29	21
721	S	9	5 43 6	161 9 11	23
722	N		5 43 7	158 21 29	21
	N	I.	16	20 40	ʃ
723	S	10′	5 43 10	158 30 29	21
724	S	10	5 43 10	158 7 29	21
725	N		5 43 12	158 33 29	21
726	S	8′	5 43 15	160 6 19	25
727	S	10	5 43 16	158 29 29	21
728	N	⊕	5 43 23	159 17 13	24
	⊕	I.	23	17 11	ʃ
729	S	9	5 43 30	158 28 29	21
730	N		5 43 40	159 34 13	24
731	S	10	5 43 43	158 9 29	21
732	S	9	5 44 0	159 29 13	24
		9′	4	29 13	24
733	S	8	5 44 3	158 40 29	21
		8	10	40 6	26
734	N	II.	5 44 11	161 24 31	ʃ
	N		12	24 41	23
735	S	10	5 44 13	159 39 13	24
736	S	10	5 44 14	157 46 25	22
737	S	10	5 44 17	158 33 36	26
738	S	7	5 44 17	158 9 36	26
		7′	21	9 29	21
739	N	III.	5 44 26	156 58 42	ʃ

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
740	S	8	5 44 28	160 27 19	25
		8	33	27 19	25
741	S	10	5 44 32	156 50 0	27
742	S	10	5 44 37	160 5 19	25
743	S	9	5 44 38	159 19 13	24
744	S	10	5 45 9	161 45 11	23
745	N	III.	5 45 11	159 14 40	ʃ
746	N	II.	5 45 16	160 42 54	ʃ
747	N	II.	5 45 17	158 36 30	ʃ
748	S	10	5 45 18	157 14 15	22
749	S	9	5 45 21	159 33 13	24
750	S	10′	5 45 22	157 5 25	22
751	S	9	5 45 23	160 32 19	25
752	S	10′	5 45 24	157 6 25	22
753	S	10	5 45 27	161 13 11	23
754	S	8′	5 45 28	160 8 19	25
755	S	10	5 45 30	157 32 34	28
756	S	9′	5 45 35	160 2 19	25
757	S	9′	5 45 40	157 7 25	22
	—	10	41	7 4	28
758	S	9	5 45 46	161 25 11	23
759	S	9	5 46 2	158 5 36	26
	—	9	8	5 36	26
760	S	9	5 46 11	160 29 19	25
761	S	8′	5 46 12	161 6 11	23
762	S	10	5 46 15	159 10 13	24
763	S	10	5 46 16	159 3 43	24
764	S	9	5 46 20	157 54 34	28
765	S	10	5 46 33	158 54 36	26
766	S	8	5 46 33	160 16 29	ʃ
	—	6′	36	16 19	25
767	S	9	5 46 41	157 46 1	ʃ
	—	8	42	4	28
768	N	III.	5 46 52	161 3 23	ʃ
769	N	III.	5 46 52	158 6 11	ʃ
770	⊕	II.	5 46 57	159 50 20	ʃ
771	S	10	5 47 0	157 45 4	28
772	S	8	5 47 20	156 44 30	27
773	S	9	5 47 20	157 28 34	28
774	S	10	5 47 20	158 32 36	26
775	S	10′	5 47 28	159 23 13	24
776	S	8	5 47 54	157 48 32	ʃ
	—	8′	57	48 4	28
777	S	8	5 47 57	156 42 30	27
778	N	II.	5 48 7	158 33 43	ʃ
779	N	II.	5 48 12	157 30 5	ʃ
780	S	7′	5 48 21	156 41 0	27
781	S	10	5 48 29	156 36 0	27
782	S	10	5 48 45	160 14 19	25
783	S	10	5 48 51	159 25 13	24
784	N	I.	5 48 52	159 10 53	ʃ
785	S	10	5 48 57	156 16 30	27
786	S	9′	5 49 15	161 4 41	23
787	S	8′	5 49 24	161 38 41	23
788	S	8′	5 49 30	158 26 36	26
789	S	9	5 49 33	159 49 13	24
790	S	9′	5 49 35	160 35 19	25
791	S	8′	5 49 36	161 34 11	23
792	S	9′	5 49 37	161 49 11	23
793	S	9	5 49 39	156 4 30	27
794	S	10	5 49 44	161 43 11	23
795	S	9′	5 49 48	158 35 6	26
796	S	8′	5 49 54	156 30 0	27
797	S	10	5 49 55	156 20 0	27
798	S	8	5 49 55	161 2 31	23
799	S	10	5 49 57	160 10 19	25
800	S	10	5 50 1	159 32 13	24
801	S	6	5 50 3	156 56 34	ʃ
	—	6′	6	56 34	28
	—	6	7	56 30	27
802	S	8	5 50 8	160 25 15	31
	—	7	10	24 19	25
	—	8	12	24 19	ʃ

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
803	S	10	5 50 18	156 39 0	27
804	S	11	5 50 19	156 57 4	28
805	S	8′	5 50 22	161 0 11	23
806	S	10	5 50 29	160 16 50	31
		10	31	17 19	25
807	S	10	5 50 30	161 23 11	23
808	S	10	5 50 31	156 34 0	27
809	C	VI.	5 50 35	160 6 44	ʃ
	N		35	6 49	25
	N		36	6 45	31
810	S	10	5 50 37	156 25 0	27
811	S	8′	5 50 39	157 5 4	28
812	N	III.	5 50 43	161 31 11	ʃ
813	S	8′	5 50 55	159 50 43	24
	—	8′	59	50 23	28
814	S	10	5 50 58	156 26 0	27
815	S	10	5 51 2	156 39 30	27
816	S	10	5 51 5	156 46 0	27
817	S	10′	5 51 23	156 15 0	27
818	S	8	5 51 31	159 53 23	28
819	S	10	5 51 32	160 3 49	25
820	S	7′	5 51 32	158 27 36	26
821	S	9	5 51 32	158 6 36	26
822	S	10′	5 51 38	160 14 15	31
	—	10	41	13 49	25
823	S	10	5 51 42	159 16 23	30
824	S	10′	5 51 47	159 36 23	30
825	S	10	5 51 48	160 45 45	31
		10	53	45 19	25
826	S	10	5 51 49	158 9 6	26
827	S	10	5 51 53	156 16 0	27
828	S	10′	5 51 56	156 47 0	27
829	S	10	5 51 59	157 5 34	28
830	S	10	5 52 5	158 43 36	26
831	N	III.	5 52 15	159 31 38	ʃ
832	S	10	5 52 18	156 40 0	27
833	S	10	5 52 18	161 33 11	23
834	S	10′	5 52 26	157 5 44	28
835	S	10	5 52 26	160 40 15	31
836	S	7	5 52 32	159 57 15	31
	—	7′	36	55 43	30
	—	7	40	56 19	ʃ
837	S	10′	5 52 37	159 57 20	31
	—	10′	42	55 33	30
838	N	II.	5 52 43	159 23 54	ʃ
839	N	II.	5 52 45	157 21 55	ʃ
840	S	10	5 52 48	160 51 15	31
841	S	8′	5 52 51	161 24 11	23
842	S	9	5 52 58	157 36 4	28
843	S	9	5 53 6	158 13 36	26
844	S	10	5 53 7	158 22 6	26
845	S	10	5 53 11	157 59 34	28
846	S	9	5 53 13	156 25 0	27
847	S	10	5 53 15	160 43 15	31
848	S	7′	5 53 16	160 32 15	31
849	S	10	5 53 18	157 17 4	28
	—	9′	21	17 34	28
850	S	8	5 53 24	161 54 41	23
851	S	9	5 53 24	159 49 53	30
852	S	10	5 53 25	160 56 15	31
853	S	8	5 53 33	158 60 26	26
	—	8′	36	59 53	30
	—	8′	37	61 3	29
854	S	9	5 53 44	158 29 6	26
	—	9	58	28 3	29
855	S	10′	5 53 48	161 1 41	23
856	N	II.	5 53 52	161 12 35	ʃ
857	S	10′	5 53 55	159 44 23	30
858	N	II.	5 53 59	157 27 17	ʃ

No. for Reference.	Obj.	Mag.	R A. 1830.0. h. m. s.	N P D. 1830.0. ° ′ ″	Zone.
859	N		5 54 14	161 7 11	23
	N	I.	19	8 9	ʃ
860	S	9	5 54 20	161 58 11	23
861	N	II.	5 54 22	159 31 7	ʃ
862	S	10	5 54 26	160 58 15	31
863	S	9′	5 54 29	159 6 23	30
864	S	8′	5 54 31	156 31 0	27
865	N	III.	5 54 38	159 30 39	ʃ
866	S	9′	5 54 52	159 2 33	30
867	S	10	5 54 53	161 0 11	23
868	S	8	5 55 4	160 53 15	31
869	S	9	5 55 10	161 33 11	23
870	N	II.	5 55 11	158 37 14	ʃ
871	S	8	5 55 19	159 15 23	30
872	S	9	5 55 28	157 13 4	28
873	S	9	5 55 29	157 44 4	28
874	S	10	5 55 31	161 0 11	23
875	S	10	5 55 49	158 4 33	29
876	S	7′	5 55 54	157 33 34	28
877	S	10	5 55 55	160 41 15	31
878	S	10	5 56 0	160 41 45	31
879	S	10	5 56 2	161 21 11	23
880	S	10	5 56 9	160 39 15	31
881	S	7′	5 56 12	157 5 4	28
882	S	8	5 56 18	158 4 4	ʃ
	—	7	19	5 33	29
883	S	8	5 56 26	157 33 34	28
884	N	III.	5 56 31	158 13 22	ʃ
885	N	II.	5 56 37	160 56 47	ʃ
886	S	8	5 56 41	160 33 15	31
887	S	10	5 56 44	158 17 3	29
888	S	8′	5 56 44	161 59 11	23
889	S	10	5 56 47	156 40 0	27
890	S	7′	5 56 51	156 20 0	27
891	S	8′	5 56 57	159 26 23	30
	—	8′	58	26 23	30
892	S	8′	5 57 10	160 58 41	23
	—	10	11	60 15	31
893	N	II.	5 57 16	159 35 3	ʃ
894	S	9	5 57 25	161 41 11	23
895	N	II.	5 57 26	159 2 8	ʃ
896	S	8′	5 57 39	157 24 4	28
897	N	III.	5 57 46	156 25 1	ʃ
898	S	10	5 57 49	157 40 34	28
899	S	9′	5 57 52	161 27 11	23
900	S	10	5 57 53	161 22 11	23
901	N	II.	5 57 56	157 16 18	ʃ
902	S	10	5 58 11	156 20 30	27
903	S	8′	5 58 18	160 20 15	31
904	S	9	5 58 35	157 42 4	28
905	S	7′	5 58 40	159 29 23	30
906	S	8′	5 58 42	161 31 11	23
907	N	II.	5 58 42	158 28 8	ʃ
908	S	9′	5 58 44	161 55 41	23
909	S	10	5 58 44	159 18 53	30
910	N	⊕	5 58 49	159 12 3	ʃ
	N		50	12 23	30
	N		52	12 33	30
911	N	II.	5 58 59	158 17 52	ʃ
912	N	II.	5 59 0	158 38 9	ʃ
913	S	10	5 59 1	161 52 11	23
914	S	10	5 59 13	157 4 4	28
915	S	8	5 59 30	161 26 41	23
916	S	9	5 59 35	160 14 15	31
917	S	10	5 59 45	157 2 4	28
918	S	10	5 59 46	159 35 23	30
919	N		5 59 48	158 31 3	29
	N	⊕	49	31 2	ʃ

No.
3 B. 787.
4 B. 786.
7 B. 788.
15 B. 790.
20 B. 800.
21 B. 801.
24 B. 805.
39 B. 813.
41 B. 814.
42 Is a duplicate of No. 37 numbered by mistake.
51 B. 822. 5′ error in N P D in B.
53 B. 821. B has 5′ error in N P D. This is no doubt also identical with B 820.
66 B. 827.
74 B. 832. Probably identical with B. 829, in which 1° error in P D exists.
76 Possibly = No. 80.
83 B. 837.
85 B. 839.
86 B. 838?
110 By measurement of drawing.
111 A double star in a cluster.
135 B. 864.
142 B. 867.
153 B. 871.
159 B. 875.
172 B. 880.
189 B. 886.
193 B. 889.
217 B. 895.
227 B. 897.
231 B. 898.
245 The *f* obs has 10^m R A.
250 B. 912.
262 Double.
263 B. 920.
274 B. 922.
277 B. 926.
281 The 1st neb in fig. 6, Pl. III.
282 The 1st of the southern cluster of nebulæ in fig. 6, Pl. III.
283 The principal neb in the ditto, ditto.
288 The star s p the central star of fig. 6, Pl. III.
289 The last nebula in the southern cluster of nebulæ of fig. 6, Pl. III.
290 The chief star in the centre of the figure 6, Pl. III.
295 B. 927 no doubt; but the R A of B. is 20^s too little if my obs be correct.
297 The very faint neb following a double star in fig. 6, Pl. III.
305 Double 10 and 10.11 m.
308 B. 936.
313 B. 940.
318 B. 941.
323 B. 939. R A in B. is probably 1^m too small.
328 B. 947.
331 B. 950. The P D of the Brisb. Cat. is 160°, which is a misreading. My obs being in the midst of a zone is liable to no such mistake.
332 B. 951.
336 B. 952.
339 B. 953.
359 Double 40″, 9′ and 11 m.
381 Is possibly the neb. 387 seen as a faint star in the equatorial.
384 The 1st faint nucleus of the cluster of nebulæ, figure 2, Pl. III.
388 B. 967.
389 The 2nd nebula of the cluster of neb, fig. 2, Pl. III.
393 The 3rd ditto, ditto.
398 The 4th the following and brightest of ditto.
399 The small detached nebula of fig. 2, Pl. III.
408 Possibly the nebula No. 405, seen in the equatorial as a faint star.

No.
414 Possibly the neb No. 421, seen as a faint star.
418 B. 971. Double 5th class, 7 and 11 m.
423 B. 974.
428 Double.
432 1st of a group.
442 2nd of ditto.
444 The obs of zone 20 is of the middle of the stars 443 + 444, seen as one.
445 3rd of a group.
446 1st of another group.
448 2nd of ditto.
449 3rd of ditto.
450 Nebulous in equatorial.
452 4th of a group.
453 B. 983.
458 4th of a group.
460 5th ditto.
463 6th ditto.
464 B. 985.
468 A double st in cluster.
473 B. 989.
478 B. 991.
491 B. 993, ? 1′ error P D.
508 B. 1001.
522 B. 1004.
529 B. 1008. Double, companion = 11 m.
567 B. 1016.
592 *f* makes the degree 159; 160 is right.
601 B. 1023.
615 B. 1025.
618 Possibly No. 613 taken a second time.
651 B. 1037.
655 B. 1038. The great looped nebulæ, fig. 4, Pl. II.
663, 664, 665 } Two stars of 10 m involved in a nebula or very faint cluster.
670 The place of this ✻ is better determined as No. 87 in the Catal. accompanying the monograph of 30 Doradûs, viz., 5 40 18, 159 18 26. It is too small for good obs in the equatorial.
678 The preceding of the double neb, Pl. III, fig. 4.
680 The n p of the four principal nebulæ of the group. Pl. III., fig. 4.
681 The s p of ditto, ditto.
682 The following of the double neb in ditto.
685 The n f of the four principal in the group, fig. 4, Pl. III.
686 The s f of ditto, ditto.
688 The v F neb preceding a star in ditto.
689 The said star in ditto.
697 The neb following this star in ditto.
706 B. 1047.
709 B. 1050? if errors be presumed in B. of 20^s in R A, and 10′ in P D. If not, B. 1050 does not exist.
732 Double 9 and 12 m.
733 B. 1059.
766 B. 1065. The R A of B is probably 30^s too little. B. 1070 is probably identical with this star, and with B 1065.
776 Double.
801 B. 1091.
836 Double in *f*.
841 Double 8′, 12 m.
844 Double, 10 and 11 m.
621, 628, 629, 664, 684, 707, 710, 714 These nebulæ and clusters have been inserted, and their places deduced (in all probability with quite as much correctness as if actually taken in sweeping), from a very careful and deliberate drawing of the neighbourhood of 30 Doradûs made with the 20 feet, and duly checked and corrected by the known stars in it. No. 664 is the nebula (a very remarkable one) alluded to in the note above on Nos. 663 and 665.

CHAPTER II.

OF THE DOUBLE STARS OF THE SOUTHERN HEMISPHERE.

I.—INTRODUCTION TO THE CATALOGUE OF SOUTHERN DOUBLE STARS.

(141) The principal object kept in view during the progress of my southern sweeps was the discovery of new nebulæ, and the determination, with some degree of precision, of the places of those already known. The detection and measurement of double stars was regarded as of subordinate interest, and allowed to interfere as little as possible with the former inquiry. During sweeps, therefore, when nebulæ were expected, little leisure was allowed for any minute examination of stars, especially on new ground. But in regions which had been once or twice well swept, or where nebulæ were thinly scattered, or seemed to be altogether absent, stars down to the 6th or 7th magnitudes were (at least during the last two years over which the observations were continued) seldom finally dismissed from the field of view till they had undergone the application of one or more of the diaphragms, whether circular or triangular (almost universally the latter), with or without increased magnifying powers, according to the state of the air. Of the defining and dividing power of the telescope under such circumstances, abundant proof has been afforded in the Catalogues of double stars observed with it in England, especially in the 4th, 5th, and 6th, after the mirrors had attained a degree of perfection which, though considerable, yet fell short, in my opinion, of that to which they were wrought subsequently.

(142) To have executed a regular review of the southern heavens with the twenty-feet Reflector, for the purpose of detecting close double stars, would have required at least two additional years, and probably more, since such reviews can only be carried on with effect in those states of the atmosphere when definition is perfect. Now in the hot season these opportunities are comparatively rare. The only mode of observation in which such a review is practicable with an instrument of this construction, is by carrying out the system of zone observations on the meridian with extensive prepared working lists of known stars. But whereas, with the aid of an equatorial mounting, it is easy to follow the diurnal movement (as explained above, Art. 136), so that no object shall pass unexamined; without such aid no one star can be minutely scrutinized without the certainty of missing others, so that every zone must necessarily come to be observed over and over again, with this especial object in view,

before it can be considered as fully reviewed. And, moreover, the stars must be taken as they come on the meridian within observing hours, at favourable or unfavourable seasons, and with all the chances of partial cloud occurring on the meridian while other regions may be clear.

(143) These considerations determined me not to depart from the line of observation originally intended, and carried out in the northern hemisphere. Double stars occurring were of course always taken, and a measured angle of position as accurate as a single rapid, and not unfrequently hurried setting of the wire, secured. But (except in the circumstances above specified) no close examination was made, unless some suspicion, excited under the ordinary sweeping power (180), induced an application of high magnifying powers, and in such cases it would occasionally happen that a long and pertinacious scrutiny took place. But this was always felt to be a departure from system and a sacrifice, as it necessitated an additional sweep over the same zone to be made on a subsequent occasion, so as to fill up the vacancy in right ascension.

(144) Bearing these circumstances in mind, it will not be a matter of surprise that the Catalogue of double stars, furnished by the twenty-feet sweeps, is comparatively deficient in those of the first or closest class—meaning by this, stars of which it can be confidently asserted that the angular distance of the individuals is *under* two seconds. But independent of such drawbacks, though I have no direct statistical enumeration to bear out an assertion, I cannot help putting on record a strong *impression* that the extra-tropical part of the southern hemisphere is really poorer in very close double stars than the northern, at least in those regions of it which come to be observed on the meridian in the best seasons for definition. The almost total absence of objects of this description from the Catalogue, in the last six hours of right ascension, is the more striking, as these are precisely the best hours for definition, coming to be observed from June to October, when the atmosphere is in the most favourable condition. The examination of at all events a very large number of stars down to the 8th magnitude inclusive, under circumstances of the best possible definition, when the discs have been reduced to mere points, enables me to speak with some degree of confidence to this feature of southern astronomy. It is hardly possible that, when so defined, an angular interval from centre to centre of moderately unequal stars, exceeding three-fourths of a second, or at all events amounting to a whole second, could have escaped notice. Yet it is on such occasions that I find entered in the sweeping book such remarks as the following:—"July 23, 1835. The extreme paucity or rather utter absence of close double stars in" [this and] "the late sweeps in such wonderful nights and with such perfect action of the instrument is really surprising." "July 24. I begin to think I shall never see another close double star. It is wonderful how entirely devoid of these objects are all the late sweeps, and *that* in the finest picked opportunities for detecting them. It is a remarkable feature. *Eo ipso notantur quod non videntur*."

(145) On the other hand, the subjoined Catalogue, which contains the places reduced to 1830, and descriptions sufficient for identification, of all the double stars occurring in the sweeps, will be found to comprise a good number of such objects taken with little selection, and many, doubtless, which may be thought hardly worth entering in a formal catalogue. Yet almost all those objects offered something of interest at the time to recommend them to notice, although I will not deny that here and there, in barren and monotonous regions, an

occasional entry may have been made for the homely but useful purpose of avoiding sleep (a thing not unattended with the probability of broken bones). I have stated elsewhere (Mem. Art. Soc. ii. 472) my general reasons for not neglecting double stars of very small magnitudes, or minute companions of large stars constituting them double stars of the 5th and 6th classes, in Catalogues of this nature: reasons materially strengthened by the success which has recently attended the research of parallax by the aid of small and distant companions of conspicuous stars; and which render it desirable at least to place on record the companions, within pretty extensive limits of distance, of all the larger stars. Admitting the validity of these reasons, the Catalogue would not have been very materially curtailed by omitting the less important stars to which they do not apply; so that on the whole it has been considered advisable not to depart from the principle all along followed on previous occasions, of drawing no line—making no selection, unless the rejection of a very few stars of which companions, it is true, have been noticed, but which it would have been palpably absurd to designate as double and include as such in a formal Catalogue, be considered in that light.

(146) The arrangement of the following Catalogue is in almost every particular similar to that of the Catalogues of double stars which I have from time to time previously communicated to the Astronomical Society, especially to the 5th and 6th of those Catalogues printed in vols. 6 and 9 of their Memoirs. It consists of nine columns, of which the first contains a general number for present and future reference, attached to *each of such stars as I have not found marked as double in any previous Catalogue or list* which I have been able to consult. These numbers (pursuant to previous usage) are continued on from No. 3346, the last number of my sixth northern Catalogue, in regular progression to No. 5542. Among the stars so numbered there are a few respecting whose double nature (owing to their extreme closeness) some doubt has been expressed. If verified, as I dare say several of them at least will be, by future observers, the record here set down will be of interest, and will need a reference. The unnumbered stars occur for the most part in Struve's Catalogue, some are noticed as double in the Brisbane Catalogue, and a considerable number are identifiable with objects described in Mr. Dunlop's Catalogue of 253 double stars, published in the 3rd volume of the Memoirs of the Astronomical Society, p. 257, et seq. When, however, in comparing my observations with this last-mentioned Catalogue, I have found a star to be double in a different sense from that which caused it to be registered as double therein,—or when, with agreeing places, I have met with such discordances in the descriptions or measures, that it is impossible to suppose the same star to be intended by both observers,—a number has been affixed.* Mr. Rumker has also given a small list of double stars at the beginning of his Preliminary Catalogue of Southern Stars. This list has

* A great many mistakes appear to have been committed in the Catalogue alluded to either in the places, descriptions, or measures of the objects set down in it. In the Catalogue here presented, and in my micrometrical measures with the equatorial subjoined, are recorded my own observations of such objects in it as I have been able to find, and which, when found, it was deemed desirable to measure, though in several cases with considerable doubt as to their identity. Where, owing to great discordances in places, descriptions, or measures, the identity of the object is brought into question, a note of interrogation is affixed to the letter Δ.

After finally numbering the Catalogue, and too late for making a general change, the star No. 4883 was identified with Δ 207.

also been collated, and all the objects contained in it, with the exception of Nos. 8, 22, 23, 24, 25, 28, are found to have been observed either in sweeping or with the equatorial, and are therefore not numbered.

(147) As reference to a single copious list of objects is always preferable in point of convenience to consulting several smaller lists, it has been considered advisable to include in this Catalogue all such double stars (not previously noted by other observers) which have been encountered in the course of an examination, with the equatorial, of the Brisbane stars, as well as those which have occurred in the partial and imperfect execution of a series of zone reviews with that instrument, which when commenced I found it impracticable to carry out, and which, having been begun in a barren part of the heavens, proved very unproductive. Thus this Catalogue serves at once as an index to the 20-feet double stars, and to those of the equatorial measurements, at least such as may be considered new. Two stars, Nos. 5443 and 5444, so detected, which had been overlooked previous to numbering the Catalogue, are annexed at the end.

(148) The reduced Right Ascensions and N P D s of the several stars are given in columns 2 and 3, for 1830. The arrangement of these columns is precisely similar to that of the corresponding column in the Catalogue of Nebulæ, and requires no further explanation.

(149) The 4th column contains the angle of position, reduced for zero, or the mean of the angles so reduced, given by each observation. They are by no means to be regarded as of equal authority with the results of an equal number of measures taken with the equatorial, for a variety of reasons. 1st. They are, for the most part, much less deliberately taken. 2nd. When taken with care, and when time has been allowed for a repetition of measures, a peculiar bias of judgment seems in some cases to have influenced them, which makes it necessary to be cautious in combining them with the equatorial measures of the same stars. This is, no doubt, partly owing to the different position of the person and head of the observer at the two instruments—in the one case looking down, in the other up. To this we must add the difference of inversions due to the optical construction of the two instruments, the achromatic operating a complete, and the reflector only a semi-inversion. Owing to this cause the situation of the line of junction of two stars observed on the meridian will stand in a different relation to the *optical bias* of the eye habitually used for observing, and thus angles obtained with the two instruments will cease to be comparable. As a general principle, indeed, it may be borne in mind, that no measured angle of position of a double star, no matter with what instrument taken, can be considered free from bias, unless their line of junction lie in the principal section of the eye, and unless the diurnal motion be eliminated either by a clock-work, or by a perfectly equable movement given by hand, a condition tolerably well satisfied in my observations with the equatorial, by long practice in the use of the right ascension handle, but which the construction of the reflector rendered almost impossible to fulfil with any degree of exactness.

(150) In all the sweeps subsequent to Sw. 773, two thick wires were substituted for the single position wire, distant enough from each other to include the globe of Saturn. This, which may certainly be considered as a capital improvement in the art of measuring positions, was imitated from the equatorial, where it had been found very effective, and would have been introduced earlier in the 20 feet, but for the obstruction caused in the field of view, which it was

apprehended might interfere with the observation of small and faint nebulæ. In making the substitution of these for the single wire, the zero of position (— 0°.7) was preserved unaltered, *and has been applied to all the measures so taken as they here stand printed.*

(151) The 5th column contains the estimated distances. I consider them generally somewhat too small in the closer stars; they are also affected by the apparent size, neatness of definition, &c., of the stars, and are, of course, in a very high degree vague and precarious, serving for little more than general classification.

(152) The magnitudes follow in the 6th column. Accents are used to denote half magnitudes—as 8′ for 8.9 m. On the subject of these magnitudes, as compared with those of M. Struve, the same remark applies as in my Third Catalogue, Mem. Art. Soc. III. p. 180. My scale of magnitudes is, generally speaking, a full unit below that of M. Struve; for instance, the star which, using the 20-feet reflector, I call 10 m, that excellent astronomer, using the Dorpat refractor, would call 9 m. In the higher parts of the scale of magnitudes the difference is greater—in the lower somewhat less.

(153) In the column of remarks, col. 7, notes made at the moment of observation are recorded; the colours of coloured stars mentioned; individual angles of position recorded where a mean has been taken of several in col. 4; and some subsequent statements (indicated by brackets thus [ ]) introduced. This column also contains differences of R A, and the distances resulting from observations by the method of oblique transits.

(154) The 8th column contains references to other Catalogues, with which the stars in this may have been identified either as single or double stars. The following nomenclature is adopted:—

Roman numerals, followed by Arabic, thus (II. 47), denote Sir Wm. Herschel's classes and numbers.

H. followed by an Arabic numeral thus (H. 45), denotes the star so numbered in his Supplementary Catalogue of 145 new double stars.

A. denotes the Astronomical Society's Catalogue for 1830.

B. The Brisbane Catalogue, to which, as having been my own working Catalogue, references are most frequent.

L. Lacaille's Cœlum Australe Stelliferum, as reduced and published by the British Association.

λ. Lalande's Histoire Celeste, similarly reduced and published.

M. The Madras Catalogue, containing the results of Mr. Taylor's observations at the H. E. India Company's observatory at that station. In referring to this Catalogue, the numbers of all stars, occurring between R A. $11^h\ 5^m\ 0^s$ and $16^h\ 28^m\ 19^s$, are corrected by subtracting 900 from the reference number in its margin, as rendered necessary by the erratum unfortunately subsisting in the numbers throughout that interval.

Δ. denotes Mr. Dunlop's Catalogue of 253 southern double stars, Mem. Art. Soc. III. p. 267.

R. Mr. Rümker's list of 28 double stars in his "Preliminary Catalogue."

σ. The first Catalogue of double stars by M. Struve, published in the third volume of the Dorpat observations, containing 795 double stars, a very useful and valuable Catalogue of reference for southern double stars visible in European latitudes.

Σ. The second, or great Dorpat Catalogue of Double Stars.

h. My own former Catalogues of double stars; which, being numbered consecutively, need no especial distinction. In the very few instances where other references are needed, the nomenclature of my former Catalogues is adhered to.

Occasionally, when there has been room in the column of remarks, and not in column 8, for the identification of a star in two or more catalogues, some of the references are transferred to the former column, which also contains the star's name and letter, if any.

(155) Column 9 contains the number of the sweep in which the observation recorded was made. The corresponding dates will be found in the synoptic table appended to the Catalogue of Nebulæ (p. 129.)

Reduced Observations of Double Stars made with the 20-feet Reflector at Feldhausen, at the Cape of Good Hope, in the years 1834, 1835, 1836, 1837, and 1838.

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3347	0 0 32.8	141 6 42	85.0	20	7 14	....	......	730
	33.1	6 44	75.2	18	7 13	....	......	498
3348	0 1 34.0	150 18 20	284.3	15	9 11	....	......	734
3349	0 1 47.7	158 16 3	115.4	20	9 11	....	......	731
3350	0 2 10.5	148 24 48 :	173.0	3	9 9′	The middle of three in a line....................	......	502
	....	22 ±	174.3	2	9 10	Much beyond merid. The middle of 3 in an oblique broken line	......	735
3351	0 2 17.7	113 36 16	135±	8	11 11′	....	......	641
3352	0 2 57.4	140 35 0	308.2	3	8′ 11	The north preceding of two	......	496
——	0 5 ..	108 6 ..	345.8	67.6	7′ 8	Mean Epoch, 1836.677	h. 1944	E
3353	0 5 51.3	165 37 35	286.1	12	8′ 13	....	......	622
3354	0 6 13±	126 59 ..	......	..	9 10	3rd Class. Zone review	......	E
3355	0 6 13.9	128 33 0	31.1	2½	9 10	Ill defined	......	486
3356	0 6 34.2	130 9 5	320.6	3	15=15	The nucleus of a great nebula	......	737
3357	0 7 53.3	158 50 52	304.3	..	9 13	15″ dist? MS. indistinct......................	......	731
3358	0 7 53.5	152 23 7	12.6	12	9′ 9′	....	......	501
3359	0 12 12.2	113 32 16	110±	18	10 10	....	......	641
3360	0 13 13.1	143 27 47	10.7	15	9 10	....	......	730
3361	0 13 25.9	158 39 55	114.6	3	11=11	....	......	731
3362	0 14 13.6	109 58 2	73.3	4	7 11	Fine double ✻, but ill defined..................	......	741
3363	0 16 10.0	163 2 0	......	..	11 11	In the great cluster 47 Toucani	......	482
3364	0 16 27.1	144 55 7	193.3	25	8 12	....	......	732
	28.2	55 57	194.9	18	8′ 12	....	......	500
3365	0 17 23.8	141 46 42	174.9	18	8′ 10	....	......	730
3366	0 19 4.9	158 40 17	35.4	25	7′ 14	....	......	731
3367	0 19 7.9	122 55 22	169±	3	10′ 11	Neat double star..............................	......	620
3368	0 19 46.9	108 8 6	251.4	15	8 11	....	......	741
3369	0 20 17.5	155 44 5	344.7	12	9 11	....	......	630
3370	0 20 24.2	156 51 35	54.1	25	9 9′	Δ R A = 5ˢ.25	......	508
3371	0 21 48.4	147 38 21	334.8	8	10 10′	....	......	504
3372	0 23 19.0:	151 58 50 :	96.5	20	9 10	Place not well observed.......................	......	501
3373	0 23 21.2	109 53 45	119.4	80	7′ 8	Δ R A = 4ˢ.5	......	741
——	0 23 42.3	153 54 0	170.0	30	5′= 5′	Pos mean of 170.4, 169.7; β Toucani...........	Δ. 1	630
	44.5	53 48	171.0	35	5′= 5′	Pos mean of 170.1, 171.9, 171.0; a superb object ..	B. 58,9	631
3374	0 25 22.2	166 11 27	113.3	20	9′ 11	Δ R A = 8ˢ.0.................................	......	622
3375	0 25 22.3	125 54 30	167.4	5	6′ 8	Pos mean of 166.4, 168.5. The minute given by this obs is 26, but this must be a mistake, as also the estimated dist 15″, which no doubt should be 5″ as here set down.	B. 63	636
	23.3	54 47	170.0	4	6 7′	Pos 170.7, 169.3; very fine	......	484
	25.2	55 5	170.8	4	6′ 7	Pos 168.7, 171.8, 171.9; fine	......	486
3376	0 25 29.2	146 16 7	249.1	5	6′ 10	Pos by two coincident measures	B. 64	732
	30.7	16 16	245.3	3	8 12	Neat star; pos by two measures agreeing	......	500
3377	0 25 34.1	117 1 49	53.5	15	8 10	....	......	643
3378	0 25 37.3	152 5 15	352.3	10	8 15	Pos mean of 353.3, 351.3; very delicate..........	......	734
	39.8	5 23	353.6	9	7 15	....	......	736
3379	0 28 13.1	118 21 14	229.1	8	9 12	....	......	643

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3380	0 31 5.4	107 39 30	96.2	30	7′ 13	......	......	741
3381	0 31 14.0	134 55 43	38.6	6	10 11	......	......	489
3382	0 31 34.6	153 45 24	223.0	20	9 12	......	......	631
3383	0 32 17.2	144 18 22	216.0	4	10 11	......	......	732
3384	0 32 29.6	123 42 4	264.7	3	9′ 10	The 2nd of four stars	......	493
3385	0 32 39.3	132 8 57	242.9	4	9 10	Blotty	......	638
	41.0	7 57	240±	..	......	Pos estimated from diagram	......	639
3386	0 32 50.5	143 1 42	103.4 231.5	10 20	10 10′ 10 13	A B A C } Triple	......	730
3387	0 33 57.1	147 25 43 :	252.1	15	5′ 12	Pos mean of 254.6, 249.5, 252.3	B. 87	502
3388	0 34 49.1	145 2 37	237.6	25	9 9	......	......	732
	49.6	2 46	234.9	15	9= 9	Pos mean of 234.6, 235.3; neat star	......	500
3389	0 35 7.0	109 28 9	74.7	28	9 9′	......	......	741
3390	0 35 13.1	136 6 49	313.5	15	7′ 11	Large star orange, small blue	L. 187	490
3391	0 35 41.6	148 24 1	209.5	20	5 14	Pos mean of 207.8, 211.3; fine	B. 92	504
	41.9	23 43	212.1	25	4′ 13	Pos mean of 211.8, 212.3, 212.1		
	....	23 48	209.7	20	5 13	Very fine double star (η Phœnicis)		
3392	0 36 4.1	169 25 50	83.6	8	11=11	......	......	628
3393	0 36 43.0	165 34 50	301.9	2	11′ 12	Measured with power 320	......	622
3394	0 36 58.5	110 54 13	86.3	18	10 10′	......	......	741
3395	0 37 38.0	132 49 58	61.6	..	......	Pos 65.1, 61.6. The latter preferred, being taken with power 1200 and triangular aperture. Definition very perfect. This is a very remarkable star. The colours of both individuals are alike, viz., a very high orange, almost red.	L. 201 ?	489
	40.0	50 9	61.7	10	9 9	Pos 61.5, 61.9. Both stars of a high rose-red colour, very curious.	......	639
3396	0 37 53.0	124 12 34	216.8	2	9′ 12	Pos 216.8, 216.9; very neat	......	635
	55.5	13 21	217.3	2	9 11	Pos 214.2, 220.3, 214.7, 220.1; difficult	......	493
3397	0 38 55.9	145 1 52	......	..	......	Small star barely seen by glimpses. Definition imperfect.	L. 213	732
	56.6	2 6	160.0	10	7′ 15	Pos 155.7, 165.8; excessively difficult, though quite sure as to the existence of the small star. Verified with power 320 and full aperture.	......	500
3398	0 39 0.1	142 56 7	121.3	30	8′ 9	......	......	498
	3.4	56 7	124.3	28	9 10	......	......	730
3399	0 41 0.2	130 3 31	282.4	12	9 10	Very neat	......	638
3400	0 41 22.6	156 1 42	140.9	4	10 11	A neat double star	......	731
	25.1	1 39	141.4	3	10 10′	Pos 140.3, 142.5	......	508
3401	0 42 8.6	125 25 18	103.4	5	9 10′	A very neat object	......	635
3402	0 42 30±	144 2 ..	53.8	15	9′ 12	......	......	732
——	0 43 30—	105 46 ..	......	..	8 10	Class 2. Zone review	h. 2000	E
3403	0 44 24.9	138 13 28	335.9	5	9 11	The second star of 5	......	497
	25.0	13 44	333.7	8	10 11	The second of a group of 5	......	490
3404	0 44 32.3	150 15 25	240.1	8	9 11	......	......	501
	33.2	15 40	242.3	12	9′ 11	......	......	734
3405	0 44 40.2	156 16 33	338.1	15	10 10′	The preceding of two double st	......	731
	41.1	16 19	332.9	12	10 11	......	......	508
3406	0 45 0.6	156 16 13	220.0	25	9 14	The following of two double st	......	731
	1.9	15 54	223.6	18	8′ 13	......	......	508
3407	0 45 44.0	115 58 14	126.2	15	10=10	......	......	646
——	0 45 44.8	160 25 32	76.8	25	8′ 9	λ *Toucani* Δ R A = 4ˢ.5; Pos 78.8, 76.3, 77.2	B. 116	510
	51.2	26 18	76.0	20	8′ 9	Δ R A = 4ˢ.50	Δ. 2	509
3408	0 47 51.2	156 23 24	212.3	20	9 10	......	......	731
——	0 50 ..	106 34 ..	32.3	6.7	7′ 7′	Mean Epoch 1836.449	σ. 17	E

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3409	0 50 4.6	149 38 58	11.6	16	10 11	....	......	735
3410	0 52 29.4	122 7 32	74.4	20	9′=9′	....	......	495
3411	0 53 51.6	120 54 34	2.1	15	9′ 12	....	......	620
3412	0 53 56.4	147 4 41	148.6 315.4	25 18	8′ 11 8′ 14	Triple	......	732
3413	0 54 12.7	137 52 33	231.5	3	10 10′	....	......	490
3414	0 54 14.8	141 10 25	31.1	18	9 10	....	......	497
3415	0 56 7.5	131 33 54	157.5	1	7 8	Pos mean of 157.3, 157.8. Quite as close as 4 Aquarii. Perfectly divided with a power of 480, and the 2nd of the above measures taken with that power; the 1st with 320. A violent suspicion only of being double with 180.	L. 294	488
	....	....	159.7	⅔	......	Viewed part merid; 180 and 12 inches aperture barely elongated it; 1200 and 12 inches divides it cleanly by a full diameter of the small star. Pos taken with this power. Distance cannot exceed ½ or ⅔″ at farthest.	......	489
3416	0 56 19.5	150 60 33	308.7	6	8 8	Pos 309.3, 308.1; A third ✱ = 12 m	L. 297	736
	21.8	59 ..	306.1	3	8 = 8	Pos 305.4, 306.7, 306.3. Measured with power 320 and triangular aperture, which shows it beautifully. A third ✱ 10 m, 90″ almost exactly at right angles to the direction of the other two.	......	501
	23.0	60 15	308.6	5	7′= 7′	Pos 308.1, 309.2; fine star	......	734
3417	0 58 30.2	137 37 37	17.6	30	3′ 11	*β Phœnicis.* A mere blot......................	B. 145	497
3418	0 58 43.1	148 48 46	253.6	1¾	9′ 11	Pos 255.9, 251.3; very elegant..................	......	735
	45.5	48 28	252.0	2	9 10	A close and neat double ✱	......	502
3419	0 59 5.6	116 55 32	325±	8	11=11	....	......	643
——	1 1 2.8	146 9 16	239.3	3	5 11	Eye-piece deranged [which may be the cause of the discordant R A].	L. 318	732
	14.3	8 44	240.7	4	5 9	Pos 242.0, 239.3, 240.9; very beautiful	B. 156	500
	15.0	9 6	237.4	4	5 9	Pos 236.3, 238.5 (*ζ Phœn.*)	R. 2	504
	13±	11 ±	239.0	5	4′ 9	Pos 239.0, 244.8 : : (rejected); Rough place	......	502
3420	1 5 48.9	172 33 8	54.5	18	9 11	....	......	633
——	1 5 50.4	98 49 42	330.7	60	7 9	(37 *Ceti*)......................................	σ. 34	740
3421	1 6 28.8	141 33 47	234.5	30	8′ 8′	....	......	498
3422	1 8 2.0	146 32 25	58.4	12	8′ 12	Pos 57.0, 59.8; L ✱ yellow.....................	......	732
3423	1 9 59.4	159 46 51	12.0	2	6′ 9	*κ Toucani.* Very beautiful; excellent and careful measures with power 320 and triangular aperture.	B. 178	509
	....	....	11.3	2½	6 9	Very fine double ✱ but ill defined; no place taken.	L. 356	513
3424	1 11 1.8	99 40 5	86.3	12	10 10′	....	......	740
3425	1 11 2.2	118 23 0	256±	2	11=11	Too late for a measure	......	643
3426	1 11 8.9	157 17 31	341.7	2	7′ 11	Very neat ✱ and well measured with power 320 and triangular aperture.	B. 180 L. 361	508
3427	1 12 48.6	141 0 41	128.0	15	9 9′	....	......	498
3428	1 13 1.8	139 33 57	155.2	20	8 10	Pos 154.4, 155.9................................	......	497
3429	1 13 18.9	114 56 35	15±	5	7 9′	A neat double star	......	733
3430	1 13 41.6	148 14 24	246.3: :	1½	6′ 11	The following of 2 nearly =; measure rough, as the night will not admit magnifying; stars well separated.	L. 369	735
	43.8	15 18	251.7	1½	7′ 10	The *f* of 2; seen double with 180, but verified and measured with 320.	......	502
3431	1 14 31.7	95 30 20	91.8	12	9′ 12	....	......	739
3432	1 14 51.8	121 30 43	217.9	4	9′ 10	Neat double star................................	......	494
3433	1 15 17.6	100 48 38	307.0	12	10 11	....	......	740
3434	1 16 56.8	149 25 51	106.8	2	12 12′	Sky hazy..	......	504

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3435	1 18 52.5	150 20 55 :	355.6	25	7′ 10	Pos 355.7, 355.6; the degree by this obs is 151, but this is presumed to be an error	L. 405	501
	53.0	23 10	355.9	25	8 11	[*This place agrees best with Lac*]	......	734
	53.3	22 8	358.5	35	8 10	Pos 358.7, 358.3..............................	......	736
3436	1 19 10.6	121 6 54	126.3	12	7 10	Fine star; large pale yell; small pale blue........	L. 404	645
	12.5	6 13	121.1	10	7′ 9	Pos 123.2, 119.0; L yell; S blue	......	494
3437	1 20 ..	108 9 ..	245.2	13.4	7 9′	Mean Epoch 1836.348	λ. 2690	E
3438	1 20 21.2	140 20 58	33.9	5	10=10	....	......	497
3439	1 20 37.8	135 29 54	212.3	5	10 11	....	......	624
3440	1 21 4.2	114 7 50	297±	4	10=10	Blotty	......	733
3441	1 21 21.8	126 28 40	224.7	4	15 16	Involved in very faint nebula, an extremely delicate and difficult object.	......	486
3442	1 24 16.0	116 18 35	208.3	30	6′ 10	Blotty	......	733
3443	1 24 35.2	170 46 28	278.9	40	9 10	....	......	633
3444	1 24 51.6	144 15 3	2.6	40	8 12	....	......	732
3445	1 25 21.2	132 7 3	263.4	..	......	....	......	753
	24.3	8 12	266.3	25	9 9′	Δ R A = 1ˢ.87 by obs	......	752
3446	1 27 47.2	150 11 55	310.7	20	8 12	....	......	734
	52.6:	10 33	308.3	25	9 12	R A, probably erroneous	......	736
3447	1 28 10.6	120 46 50	74±	3	6′ 8	A fine double star	B. 227	645
3448	1 28 34.1	128 10 20	56.2	20	8′= 8′	A nebula follows nearly on parallel	......	486
3449	1 29 2.2	144 4 8	153.3	18	7′ 14	....	L. 469	732
3450	1 30 14.9	133 2 18	212±	12	9 12′	....	......	753
——	1 31 0.5	93 22 51	131.3	3	9′ 11	....	h. 641	739
3451	1 31 35.2	136 5 55	161.1	12	10=10	....	......	634
	35.5	5 52	159.9	15	10′=10′	Points north of a ⁎ 13 m......................	......	624
3452	1 32 8.6	128 19 46	277.0	20	7′ 9′	Nisi Pos = 272.0	L. 485	803
——	1 32 11.9	144 18 17	103.7	8	8 9	Neat double star (Δ. 4)	B. 240	498
3453	1 32 43.3	169 22 5	285.4	35	5′ 14	Δ R A = 17ˢ.5; large star single................	B. 242	628
——	1 33 19.6	147 3 3	300.8	2	7= 7	p Eridani. Pos 302.5, 300.7, 299.1. Fine double ⁎. Minute by obs = 32, but mistaken.	B. 243	500
	20.3	3 16	300.1	2½	7 7+	Pos 301.9, 298.8, 299.7........................	Δ. 5	504
	21.6	3 32	299.5	4	6′ 6′	Superb double star. Pos 298.8, 300.3	......	732
	24.6	4 2	299.5	4½	6 6+	Pos 299.6, 299.3..............................	......	735
——	1 33 31.7	115 18 54	101.1	4	11 11′	....	h. 2076	646
3454	1 34 43.8	167 53 45	281.7	8	10 12	....	......	628
3455	1 35 ..	108 30 ..	......	..	8′ 8′	Class 3. Zone Review	......	E
3456	1 35 10.0	112 28 34	344.4	15	8 10	....	......	641
3457	1 36 5.5	164 33 57	250±	15	9 11	....	......	441
	7.1	34 53	240.8	18	9 13	....	......	745
3458	1 36 51.6	127 33 36	315.7	5	10′ 11	Nisi pos = 310.7	......	803
3459	1 37 3.7	110 54 44	270.0	18	9′ 10	....	......	641
3460	1 37 31.3	140 57 36	161.7	15	8 13	Difficult	......	498
——	1 37 37.9	93 14 39	268.3	5	11=11	....	Σ. 161	739
3461	1 37 40.5	115 54 17	72.5	3	6 10	Pos 75.4, 71.8, 70.3. Large ⁎ white small dull red (ε Sculptoris).	A. 191	646
3462	1 38 25.6	137 40 12	31.3	12	11=11	....	......	624
3463	1 38 44.7	134 48 31	18.8	30	9 9	A third star 8 m at some distance................	......	752
	45.9	48 42	20.6	20	9= 9	Points north of a star 9 m.		
	46.6	48 53	19.3	20	9′ 9′	....	......	753

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3464	1 39 1.6	167 6 15	157.0	$2\frac{1}{2}$	8 12	Pos 157.8, 156.3, 156.9. Night not favourable. Set microm. to 149.5, the measure of ∫ 622. It will not do for a measure, and could I rely on the measure of that ∫ this star must have changed.	......	746
	3.3	6 27	149.5	2	8 11	Pos 148.8, 150.3. Difficult, not being well defined, but a fine double ∗ [? *if micrometer not misread* 10°].	......	622
3465	1 39 21.1	130 47 41	270.8	6	8′ 10	....	......	488
	23.0	48 1	273.7	12	8 11	Neat star....................................	......	638
3466	1 40 57.7	120 7 29	52±	25	8 10	Too late for measure........................	......	643
3467	1 41 27.8	170 0 15	346.0	15	6 13	Delicate	B. 259	628
3468	1 41 41.5	154 34 48	21.3	15	9 16	Pos 22.4, 20.3. Extremely difficult. It is the last but one in R A, and most south but 2 in declin. of five stars forming a hook.	......	631
3469	1 42 ..	129 12 ..	70.9	$2\frac{1}{4}$	6 10	Epoch 1837.808..............................	B. 260	E
3470	1 42 50.6	113 28 39	298.9	8	10 10′	....	......	641
3471	1 45 9.6	134 33 53	38.1	20	8 12	Pos 38.0, 38.3..............................	......	753
	12.6	34 34	41.8	25	9 14	....	......	752
3472	1 45 12.2	118 54 53	50.4	3	9′=9′	....	......	643
3473	1 49 20.5	142 27 23	192.3	12	4′ 14	(χ *Eridani*). Pos 191.4, 193.3, Extremely delicate and difficult, but quite certain of the small star.	B. 278	498
3474	1 49 44.4	171 1 20	20.9	25	6 13	Delicate	B. 279	624
3475	1 49 45.1	151 8 28	30.3	3	7′=7′	Pos 29.3, 31.3. Fine double star................	L. 584	736
——	1 51 1.7	113 44 59	309±	6	8=8	Fine double star. Too late for measure..........	σ. 51	641
3476	1 52 1.6	100 21 9	183.7	60	6 10	Large star, very yellow........................	......	650
3477	1 53 6.6	135 21 1	157.5	8	10 10	Neat double star.............................	......	624
	7.3	22 5	156.1	5	9′=9′	....	......	634
——	1 54 50.7	110 27 7	0.5	6	9′ 10	....	h. 2107	640
3478	1 55 10.0	121 8 23	138.5	30	8 8′	....	......	494
3479	1 55 28.2	153 35 8	272.4	30	8 11	....	......	631
——	1 56 48.1	109 57 46	167.1	15	10 11	....	h. 2112	741
3480	1 56 58.2	127 5 20	127.3	15	9 11	....	......	486
3481	1 59 56.4	149 58 33	3.3	18	9 11	....	......	503
	57.2	59 0	5.7	25	10′ ..	....	......	734
	60.4:	58 21:	6.2	10:	8′ 11	The places of this ∫ not good. The dist manifestly underrated.	......	501
3482	2 0 4.7	155 58 1	202.8	30	7 15	....	L. 642	631
3483	2 1 9.7	162 4 20	303.4	6	9′ 10	....	......	513
	9.7	4 13	305.6	6	9 9′	....	......	514
	13.5	3 59	309.3	5	9′ 10	Neat star....................................	......	482
	14.7	5 58	306.7	8	9′ 9′	P D right reduced. Some slip..................	......	745
3484	2 2 ..	120 27 ..	63.5	89.2	8 9′	Epoch 1837.011..............................	......	E
——	2 4 7.6	93 11 15	227.7	18	6′ 8	Pos 228.3, 227.1, (324 Bode Ceti)	Σ. 231	739
3485	2 5 0.7	140 7 20	143.0	3	9′ 10	Pos 141.9, 144.6, 142.5........................	......	744
3486	2 5 32.4	155 9 39	220.4	30	7′ 14	....	L. 676	631
3487	2 6 36.5	153 49 33	344.3	12	9 12	....	......	631
	40.2	49 36	345.8	12	8′ 10′	....	......	506
3488	2 7 29.6	152 27 5	137.8	3	8′ 8′	Pos 137.1, 138.5, 137.8. Fine star. The places not good in this ∫.	......	501
3489	2 7 33.9	161 44 56	242.6	20	8 12	....	......	514
3490	2 7 51.3	156 34 21	197.5	18	8 14	....	......	508
3491	2 8 15.8	111 47 0	286.1	5	9 9′	....	......	642
3492	2 8 31.2	123 39 20	43.0	15	10 10	....	......	635

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3493	2 10 18.4	140 20 55 :	240.5	9	10 11	....	......	744
——	2 10 29.3 :	142 17 59	210.4	80	5 9	(ϕ Eridanii) = Δ. 7	B. 327	498
3494	2 12 36.5	126 13 6	120.6	$1\frac{3}{4}$	9 = 9	A very neat double star	......	801
	42.1	14 56	124.8	$1\frac{1}{2}$	9 = 9	Very ill defined. Hardly more than much elongated, and at moments separated. S E very strong; some haze.	......	803
	48.9	15 28	122.4	$1\frac{1}{2}$	9 = 9	[These R As disagree sadly. MSS. re-examined. No error detected.]	......	802
3495	2 12 59.4	101 42 49	289±	15	10=10	A large star follows	......	650
	62.6	42 51	285.3	25	10′=10′	....	......	669
3496	2 13 42.7	158 58 30	321.4	10	9′ 12	....	......	509
	46.3	59 3	321.8	15	9′ 11	....	......	513
3497	2 14 25.1	146 43 51	81.7	35	6′ 10	....	L. 717	732
3498	2 14 27.6	118 37 55	......	10	7 16	Triple? Excessively difficult....................	L. 711	643
3499	2 15 48.4	150 47 50	64.2	4	9′ 10	The places of this sweep are bad	......	501
——	2 16 16.2	92 52 46	90.0	5	10=10	....	Σ. 266	739
——	2 17 31.2	101 23 29	265.8	10	6 11	....	h. 2140	650
3500	2 17 55.9	112 4 20	341.8	15	8′ 9	Fine double star	......	642
3501	2 21 32.5	153 57 28	335.3	20	8′ 12	....	......	631
3502	2 22 10.4	113 27 0	83.5	25	6′ 13	....	M. 841	642
3503	2 22 52.3	148 53 43	297.3	15	8 11	....	L. 770	503
	53.0	54 9	302.8	20	7′ 11	Pos mean of 302.3, 303.3	......	735
3504	2 23 0.7	121 6 39	270.8	6	8 8′	An elegant double star	......	645
	1.1	6 42	271.8	8	8 9	Fine	......	644
3505	2 25 10.5	109 6 2	23±	20	8 12	Too late for measure	......	640
3506	2 26 23.3	118 58 39	241.1	5	6′ 8	Pos 238.9, 243.3; very fine star, but ill defined....	A. 267	643
3507	2 26 24.9	154 36 17	115.5	12	9 13	....	......	631
3508	2 26 56.3	168 30 58	80.6	15	9 10	....	......	747
3509	2 26 58.5	122 16 32	53.0	25	7 11′	....	......	644
——	2 27 14.6	103 31 16	329.3	15	10 11	....	h. 2148	649
3510	2 27 49.7	133 43 6	10.7	6	8′ 9′	....	......	489
	53.4	43 58	11.9	5	10 11	Pos 11.5, 12.3	......	639
	....	....	9.3	10	9′ 12	Viewed and measured past meridian..............	......	752
3511	2 28 12.6	112 8 51	94.3	18	7′ 10	Large star, yellow; small, pale blue..............	......	641
	14.1	8 35	97.3	20	8 9′	Yellow and blue. [This observation makes the minute of R A 29. One or other must be wrong, but the earliest is chosen to avoid missing the object in future.]		
3512	2 28 31.5	115 29 58	37±	15	10′ 11	The preceding of two D stars....................	......	646
3513	2 28 34.0	133 14 10	19.7	12	9′ 9′	....	......	752
3514	2 28 37.0	146 52 32	21.7	18	9′ 11	....	......	732
	38.9	52 17	21.0	20	9 10	....	......	735
3515	2 28 38.0	115 33 18	110±	20	10′ 11	The following of 2. Pos roughly estimated from the diagram.	......	646
3516	2 29 54.3	139 8 40	323.3	30	8 11	....	......	744
——	2 29 57.7	102 7 11	214.3	12	8′ 11	Pos mean of 213.7, 214.9	Σ. 288	649
3517	2 31 5.3	159 56 35	236.4	15	8′ 12	....	......	513
3518	2 31 27.6	118 53 54	19.6 299±	10 12	8′, 12, 12	An elegant triple star	......	643
3519	2 32 9.5	173 14 27	176.7	25	9 14	....	......	633
3520	2 33 39.5	145 34 56	199.4	25	8′ 9	....	......	520
	40.8	33 48	198.3	20	8 8′	....	......	732
3521	2 33 45.8	139 43 50	263.5	20	10 10′	....	......	744
	50.3	44 20	259.3	12	9′ 10	....	......	497
3522	2 34 9.3	166 38 11	299.6	35	7′ 11	Δ R A = 7ˢ.5	L. 864	746

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3523	2 35 ..	120 17 ..	94.7	66.3	8 8	Epoch 37.011	......	E
3524	2 35 6.5	111 1 17	131.5	25	8 10	....	......	640
	7.0	1 15	135.5	20	9 10	....	......	741
	9.0	0 5	130.1	20	7 9	Hurried observation	......	641
	10.6	0 35	135.2	20	7 8′	Good measure	......	642
3525	2 35 7.0	151 18 8	274.3	45	7′ 7′	Δ R A = 4ˢ.7	......	736
3526	2 36 ..	121 48 ..	56.6	15	7 11	1834.780	B. 389	E
——	2 36 41.3	116 14 42	183.8	15	8 10′	Fine object. Marked as double in B	B. 394	646
3527	2 37 ..	131 15 ..	43.4	1.6	7′ = 7′	Mean epoch = 1836.593	B. 395	E
3528	2 37 31.6	164 11 17	212.7	10	11 11′	....	......	745
——	2 38 43.4	100 34 39	328.1	18	9′ 10	[The R A in my 5th catalogue is 39ᵐ 15ˢ.2, but the wire is mistaken.—This corrected, the R A comes out 38ᵐ 43ˢ.6].	Σ. 308	650
3529	2 39 46.2	123 0 54	111.3	18	9′ 15	....	......	635
3530	2 40 48.0	171 29 8	175.7 207.3	15 10	8′ 12 8′ 14	A B. Pos 176.3, 175.2 } v diff. A C.—Pos 205.2, 209.5 }	......	633
——	2 41 3.8	101 15 39	157.6	1½	8 9	Ill defined; bad measure	Σ. 315	650
3531	2 41 17.5	130 58 48	32.3	15	10′ 10′	....	......	743
3532	2 41 48.2	128 7 5	150.6	6	6′ 8	Pos 150.9, 150.4. *v* Fornacis	B. 413	801
	51.2	7 41	150.6	10	6 7	Pos 150.9, 150.4	......	802
3533	2 42 0.0	110 57 42	274.4	45	8 8′	....	......	640
	0.0	57 54	275.4	45	8 9	Large star yellowish, small bluish Δ R A = 3ˢ.0	......	741
——	2 42 20.1	115 16 0	......	..	6	Triple classes 5 and 6; *h*. 2161	L. 890	646
3534	2 42 33.3	150 52 28	213.1	25	9 12	....	......	736
3535	2 42 35.7	118 38 53	......	..	6	A strong suspicion that this star is a close double star, but no time to verify it	L. 892	643
3536	2 43 22.5	126 32 45	3.5	4	6 13	Pos. 2.8, 4.3. Most delicate and beautiful	M. 967 L. 897	636
3537	2 43 46.8	130 58 48	32.3	15	10′ 10′	....	......	743
	48.9	59 33	29.7	18	10 10′	....	......	638
3538	2 46 4.3	152 55 3	301.0	15	9 12	The preceding of 2 stars	......	736
	6.3	54 15	290.6	12	10 13	A star 9 m follows	......	755
	8.5	54 35	298.0	12	9′ 14	....	......	808
3539	2 47 17.3	168 50 5	59.8	10	10 10′	....	......	747
3540	2 48 3.4	151 35 10	4.6	7	10′ 12	....	......	755
3541	2 48 13.8	150 37 28	151.2	1½	8 10	Fine ✳; Pos 148.8, 152.3, 154.3, 149.4	......	736
3542	2 50 18.0	155 1 45	142.7	12	10 10′	....	......	808
3543	2 50 24.9	119 39 12	90±	..	......	Triple. Classes I. and II.	......	643
3544	2 50 30.8	133 26 24	192.4	2	9′ 11	....	......	489
	33.3	26 28	185±	1½	9′ 10	Too ill-defined for measure	......	639
	....	....	187±	2	10 12	Viewed and roughly measured past meridian, having lost time by examining another star by mistake for this	......	752
3545	2 51 22.4	100 6 9	65.3	40	7 9	....	......	650
——	2 51 48.3	130 59 19	82.3	12	4 5	(*θ Erid.*) Pos Mean of 82.7, 81.9	A. 325	743
	49.6	59 25	81.4	15	5 6	Superb D star. Pos 79.1, 83.3, 81.8, 81.3	Δ. 9	638
3546	2 53 21.6	108 34 12	82.3	8	9 12	A star 7′ m 3′ n p.	......	640
3547	2 53 44.4	159 49 50	115.6	10	9′ 12	....	......	513
3548	2 56 7.4	112 2 21	122.2	12	7 12	....	......	641
3549	2 56 27.0	128 44 53	276.1	4	10′ 13	....	......	801
	29.4	45 10	273.3	5	10 12	....	......	636
——	2 58 6.2	141 59 30	68.7	30	7′ 7′	(Δ. 10)	B. 473	655
——	2 58 37.2	103 59 11	12.3	15	9 10	Pos 12.4, 12.2	Σ. 356	649
	37.6	59 40	12.3	18	7′ 11	....	......	648

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3550	2 59 10.7	141 59 6	68.3	35	7 8	....	B. 473	807
——	3 0 12.0	103 14 56	293±	5	10 10′	....	Σ. 357	649
——	3 0 17.1	94 20 25	351.6	15	9 11	....	Σ. 358	739
3551	3 1 54.1	104 38 10	134.6	15	9 10	....	......	648
3552	3 2 27.7	161 8 13	354.7	12	9 12	The following and larger of 2, extremely ill-defined	......	513
3553	3 2 57.2	128 31 20	224.1	15	9 10	Good measure..	......	636
3554	3 4 11.8	93 32 48	348.3	18	8′ 11	....	......	739
3555	3 4 54.4	119 39 50	306.1	3	4 7	12 Eridani. Very fine D star	A. 353	643
3556	3 6 27.0	135 3 29	230±	1½	......	With the utmost difficulty I get a glimpse of the star as wedge-shaped, but the definition is growing very bad.	B. 501	805
	29.9	3 15	233.3	1½	6 11	Pos 234.3, 232.4. A most beautiful object	......	634
3557	3 6 51.5	104 3 55	9.9	20	7′ 12	....	......	651
3558	3 6 57.8	104 39 34	150±	12	10 10	Position merely estimated from the diagram	......	757
3559	3 7 4.6	154 33 35	37.8	40	6′ 11	....	L.1033	808
3560	3 7 26.6	174 53 5	234.6	12	11 12	....	......	633
3561	3 9 9.4	110 35 0	135.3	12	8′ 12	....	......	652
3562	3 9 ..	154 57 ..	328.8	48.4	8′ 9	Epoch 1836.901	......	E
3563	3 9 40.9	113 39 30	246.5	7	8′ = 8′	A very pretty double star	......	642
3564	3 10 52.8	150 8 5	274.4	30	6 13	Large star, yellow	B. 521	755
	54.0	8 41	275.8	30	5′ 13	Very ill defined	......	756
	59.0	8 43	271.9	20	8 13	....	......	519
3565	3 11 ..	109 6 ..	110.4	5.8	5 9	Epoch 1835.814..............................	......	E
3566	3 11 22.5	156 27 20	40.8	12	9 12	....	......	508
3567	3 12 21.4	104 36 50	100±	3	10′ 12	....	......	757
——	3 12 27.9	155 4 33	97.5	20	7 9	....	B. 529	517
	29.0	4 15	101.6	20	7 10	....	Δ. 12	808
3568	3 13 30.5	169 37 43	222.4	..	7 9	Δ R A = 3ˢ.6 ; Pos 222.5, 222.3	......	747
3569	3 14 5.2	103 53 26	210.5	18	9′ 11	....	......	649
3570	3 14 6.6	110 56 41	......	..	6	Triple or quadruple	......	641
3571	3 14 23.1	143 45 8	87.4	15	10′ 11	....	......	655
——	3 15 8.3	101 57 29	325.3	40	8 12	Taken for Σ. 387, which was not found	h. 2187	650
3572	3 16 34.5	116 49 47	274.3	20	8 = 8	....	......	643
3573	3 17 56.6	140 36 15	240±	15	8′ 11	Position roughly estimated from the diagram	......	744
3574	3 18 44.7	112 6 20	95±	..	......	Near a cometic nebula. Pos estimated from diagram.	......	642
3575	3 19 31.8	141 40 0	41.9	30	8 12	....	B. 551	806
	32.1	40 1	41.2	25	7′ 12	....	......	807
3576	3 19 ..	136 14 ..	339.2	4.2	7 9	Epoch 1836..................................	......	E
3577	3 20 42.3	172 27 6	243.9	10	8′ 12	Difficult, a 3d ✻ in same direction	......	633
3578	3 20 51.3	122 48 ±	......	15	8 10	....	......	645
	53.5	48 ±	......	..	......	No description	......	644
——	3 21 52.0	101 43 59	49±	1	......	If double, but too ill defined to be sure. [The angle of position though rude is sufficiently near to M. Struve's to prove that the division of the star was no illusion].	Σ. 407	650
3579	3 22 24.9	134 15 0	263.3	15	7′ 11	....	......	639
3580	3 26 27.7	153 32 5	122.4	60	4 12	Called 6 m in B	B. 566	808
3581	3 27 41.2	171 6 21	320.9	5	10′ 11	....	......	747
3582	3 27 43.0	174 9 57	286.2	15	7 11	Pos 286.6, 285.8............................	......	633
3583	3 30 8.7	111 1 47	89.0	12	10′ = 10′	....	......	741
3584	3 31 15.8	141 45 53	354.5	10	8′ 13	Points to a star 13 m	......	655
	....	46 11	357.3	12	9 13	Too late for R A	......	806

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3585	3 32 28.3	175 0 57	276.5	12	11=11	Δ R A = 8s.0	......	633
——	3 32 49.9	103 11 4	232.1	30	8′ 10	Pos 233.9, 231.3	Σ. 436	757
	....	....	228.7	35	8 9	Pos 228.5, 228.9	......	649
3586	3 33 2.9	136 11 6	158.1	20	10=10	......	......	654
——	3 33 41.3	130 54 29	327.1	12	8 8′	Pos by two measures coinciding	B. 583	754
	41.5	54 37	327.2	12	8 8′	Pos 327.8, 326.7. (Erid. 184)	Δ 15	743
——	3 34 46.8	150 20 3	250±	30±	7 8	Place taken from the Brisbane Catalogue. Pos and dist. roughly est. from diagram.	B. 586 Δ. 14	756
3587	3 35 3.3	150 22 36	229.1	10	8 13	Following the coarse double star B. 586	......	756
	4.3	22 55	......	..	......	The small star not seen for clouds	......	755
	10.6::	22 25::	228.0	9	8′ 12	Two very bright stars n p	......	501
3588	3 36 35.6	101 19 9	222.9	40	7′ 9	......	......	650
——	3 37 44.9	103 52 41	320.9	20	9′ 10	......	Σ. 451	649
	....	....	322.6	20	9 10′	......	......	757
3589	3 38 4.6	131 11 37	346.8	6	7 11	Pos mean of 347.0, 346.7	B. 594	754
	6.6	11 59	344.7	7	7′ 10	Neat double star	......	743
3590	3 39 20—	132 26 —	......	..	7′ 8′	4th class. Zone review	......	E
3591	3 39 54.8	141 50 53	321.6	12	9 12	......	......	806
3592	3 40 14.9	144 48 19	4.3	4	6 10	Very elegant. Large star, yellow. Small pale blue; Pos 2.8, 5.3, 4.7. [Extraordinary discordance of pos with the equatorial measures].	B. 602	520
3593	3 40 30.6	131 11 36	137.2	18	9 12	......	......	754
3594	3 40 51.8	110 56 24	87.3	12	8 14	......	......	652
3595	3 41 28.8	173 10 53	319.5	6	10 11′	The southern of a triangle	......	633
3596	3 41 52.6	122 18 22	136.7	10	8 8′	......	L. 1240	644
3597	3 42 3.3	142 45 20	260.2	5	10 12	......	......	655
——	3 42 18.7	128 9 13	199.3	10	5 6	f Eridani. Superb	A. 426	801
	21.5	8 45	200.5	12	6 7	Superb double star, but very ill defined. Pos 200.7, 200.3. Marked as double in the Brisb. Catal.	Δ. 16	660
3598	3 43 19.9	140 58 32	227.6	12	9 10	......	......	526
	22.3	57 30:	224.7	20	9 12	......	......	744
	23.5	57 57	225.7	15	9′ 12	......	......	806
3599	3 43 34.9	109 25 45	66.7	12	10 10′	This or the next obs. seems to have a mistaken reading of 10° in Pos.	......	741
	37.6	25 58	76.8	12	8 9	Neat star	......	652
3600	3 44 1.5	154 35 55	11.7	18	9′ 10	......	......	808
3601	3 44 18.3	113 26 58	303.5	15	8′ 10	......	......	647
	21.5	26 50	298.3	15	8 11	......	......	642
	22.3	26 45	301.1	12	8 10	......	......	641
3602	3 44 18.7	117 59 32	347±	4	10=10	Neat double star	......	643
3603	3 44 25.0	161 32 5	76.0	20	9 9′	Δ R A = 4s.5	......	513
3604	3 46 49.3	139 17 20	301.1	7	11 12	......	......	744
3605	3 47 9.7	170 52 4	165.1	10	9 10	Neat star	......	633
	29.5	51 40	168.6	18	9′ 11	......	......	747
3606	3 48 30.2	161 18 55	333.3	15	9′ 10	......	......	513
3607	3 48 43.6	171 23 59	120.3	35	8 9	Δ R A = 14s.5	......	633
3608	3 50 5.3	104 0 28	233.6	45	3′ 13	γ Eridani, marked as 2.3 m in A S C, but it is certainly not above 3.4.	A. 440	757
3609	3 50 6.8	153 10 15	132.6	3	11 11	One of a group	......	501
	10.4	10 20	125.1	5	11=11	The second in a group	......	756
3610	3 50 38.6	153 8 28	186.8	2½	10 12	......	......	501
	40.5	8 40	183.9	3	10 11	The 5th star in a group	......	756
3611	3 50 40±	130 25 32	140.3	4	9 9′	Very neat star, but the R A liable to considerable error, being beyond the meridian when taken.	......	754

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3612	3 52 5.6	170 32 29	159.2	25	8 10	....	......	774
	22.8:	33 5	159.5	20	7′ 9	Pos 158.6, 160.3 fine ✱ ; R A very uncertain	......	633
3613	3 52 35.8	104 59 55	147.7	6	10 10′	Neat double star..........................	......	651
——	3 52 48.9	100 56 49	9.3::	12	9 9	A third star, 10 m near....................	Σ. 487	758
3614	3 55 4.9	127 35 31	42.3	15	9′ 10	....	......	661
3615	3 55 16.0	105 36 50	160.6	25	8 9	....	......	651
3616	3 55 46.2	135 19 26	136.0	20	9 10	....	......	654
3617	3 56 0.2	102 13 26	61.3	15	8′ 12	....	......	757
	2.5	13 57	63.6	15	9 12	....	......	758
3618	3 56 31.5	139 60 12	318.4	4	11 11′	....	......	626
	34.0	59 5	317.4	6	10 10+	Neat star ; Pos 317.2, 317.6..................	......	744
3619	3 58 1.9	102 14 18	324±	15	10 12	....	......	757
3620	3 58 —	134 57 —	......	..	7′ 8′	Class 5 ; zone review........................	......	E
3621	3 58 22.3	124 18 2	110.3	15	8′ 8′	Fine star. It is barely possible that this may be identical with the subsequent star by a double mistake of 10ˢ in the chronometer reading, and 2° in the Polar distance index—the latter a thing most improbable. If they be really distinct, the coincidence in other respects is remarkable.	......	663
3622	3 58 34.7	126 18 26	111.1	12	9′= 9′	Pos 110.7, 111.5. Neat star....................	......	635
	34.9	17 40	116.0	12	8′ 9	Pos 116.3, 115.8. Fine D star..................	......	661
3623	4 0 5.3	122 54 52	302.7	5	9′ 10	Neat star..................................	......	663
3624	4 1 58.1	165 13 31	21.3	20	10 10′	....	......	745
	66.5	13 18	22.7	20	9′ 11	....	......	622
	68.3	13 6	19.5	20	9 11	....	......	746
3625	4 4 38.8	142 19 46	184.4	15	10 10	....	......	807
3626	4 5 10.8	99 54 59	38.3	18	8′ 11	....	......	650
3627	4 6 —	124 12 —	303.3	29.7	8 10	Mean epoch 1837.962	......	E
3628	4 6 —	126 36 —	50.1	50.5	7 7	Epoch 1838.082.............................	......	E
——	4 6 17.9	100 41 2	146.6	5	6′ 12	Pos 146.7, 146.6 ; a fine object. [Query if not changed in position.]	Σ. 516	758
	19.6	41 19	140±	5	6 11	(39 *Eridani.*) A beautiful star. Too late for a measure.	......	650
3629	4 6 31.2	106 59 0	84.1	15	8′ 10	....	......	651
3630	4 7 17.9	139 24 25	97.5	25	8 13	....	......	744
3631	4 7 51.6	159 29 46	226.3	4	9 10	....	......	513
	55.8	29 43	221.6	4	9′ 10	....	......	509
3632	4 8 23.0	120 30 22	157±	12	7′ 9	....	L.1395	644
3633	4 9 43.9	107 13 45	9.1	25	10 10′	....	......	651
3634	4 10 4.9	135 2 56	330.7	15	9′ 9′	A fine double star	......	639
	7.3	2 14	335.7	10	9 9′	....	......	804
3635	4 10 47.0	146 29 59	326.6	10	9 11	A nebula follows...........................	......	521
3636	4 11 27.4	124 13 6	13.4	50	3 14	....	A. 482	662
	27.7	13 0	15.9	60	3 13	....	......	663
3637	4 11 55.5	117 8 29	......	35	9′ 10	....	......	646
3638	4 12 14.4	152 54 10	353.6	40	4 12	Pos 354.3, 352.9 (*α* Reticuli)	A. 485	808
	15.9	53 1	353.8	60	4′ 13	Pos 353.3, 354.3.............................	......	524
3639	4 12 18.8	139 24 50	91.8	15	9 13	Some doubt about the minute in R A	......	526
3640	4 12 22.5	166 19 50	71.9	15	9 13	....	......	622
	26.6	18 10	71.4	10	9 14	Delicate ; 15″ dist is too far	......	746
3641	4 12 34.3	152 37 14	287.8	10	5′ 13	Pos 288.8, 286.8 ; fine star	L. 1245	756
	....	37 ±	283.3	6	5′ 11	Fine. A large star near *α* Retic	......	524
——	4 12 53.8	104 38 15	192.8	20	9 11′	....	Σ. 532	757
3642	4 13 —	124 17 —	157.6	5.9	7 10	Epoch 1837.894.............................	......	E

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3643	4 13 55.4	134 41 1	115.5	60	5′ 8	(ψ Horologii)	B. 687	639
	58.2	40 40	116.3	80	6 9	Δ R A = $6^s.0$.		
——	4 14 8.9	100 22 19	333.2	15	8 11	Pos 334.5, 331.9..................................	Σ. 537	650
3644	4 14 28.1	116 8 16	37.5 20±	40 25	6 8 6 14	Triple. Pos and dist of the small ✻ estimated from the diagram.	A. 493	646
——	4 16 —	153 40 —	6.1	6.2	6 9	θ Reticuli. Epoch 1835.805. [*Noticed as double by Rumker*].	B. 695	E
3645	4 16 5.9	134 46 0	142.3	6	10′ = 10′	....	......	639
	6.6	45 1	139.1	8	10′ = 10′	....	......	654
3646	4 16 14.0	131 37 11	135.8	60	8 10	....	......	754
3647	4 16 24.3	108 29 15	30±	25	10,10,11	An equilateral triangle. Pos estimated from the diagram.	......	651
——	4 16 35.3	99 9 9	350±	1½	8′	I am almost certain that this star, the preceding of two, is close double, but could not follow to verify it, the telescope being north of zenith.	Σ. 544	650
3648	4 17 4.1	134 0 39	22.2	8	10′ 10′	....	......	804
3649	4 20 28.1	104 22 12	168.5	25	10 = 10	Pos 169.2, 167.8..................................	......	757
3650	4 20 53.1	130 54 39	178.0	3	6 9	Seen double, and measured with the triangular aperture and 180, which shows it well.	B. 712	754
——	4 20 54.3	147 27 37	226.1	5	8′ 9	Fine star. Pos 227.6, 224.6. [Noticed as double by Rumker].	B. 713	519
3651	4 22 45.8	154 34 55	60.5	15	9 10	There can be no doubt of the identity of this object and the next, the degree of P D being misread in one or other: 153 appears to be the right.	......	808
	52.0	153 34 22	59.9	15	9′ 10	....	......	518
3652	4 22 55.2	123 57 9	117.9	8	9 12	....	......	662
3653	4 23 2.8	106 49 30	148.5 :	40	8 8′	Not a good measure of pos	......	651
3654	4 23 18.6	157 7 14	94.7	15	6′ 12	....	L.1511	508
3655	4 23 41.6	154 29 15	157.8	15	8 13	....	L.1510	808
3656	4 23 42.6	154 37 30	255.1	20	10 10′	....	......	808
3657	4 23 46.4	156 39 29	336.7	10	10 10′	....	......	653
3658	4 24 17.1	139 58 42	116.7	3	9′ 10	Very neat star. Pos 116.7, 116.8	......	526
	17.6	58 22	117.1	5	9 9+	Very neat D star. Pos 118.7, 115.6	......	744
3659	4 24 27.3	126 1 43	35.6	30	6 14	....	M1592	663
——	4 25 8.2	102 30 12	345.7	2½	9 9	Pos 346.6, 344.7, 345.7..............................	Σ. 564	757
3660	4 25 47.1	155 52 48	251.7	18	10 10′	....	......	517
3661	4 26 34.0	157 39 13	8.3	8	10′ 13	....	......	653
——	4 27 6.1	100 5 18	262.8	18	8′ 9	....	Σ. 570	758
3662	4 27 26.5	156 4 51	47.8	30	8′ 10	Δ R A = $4^s.0$..	......	761
	27.2	5 4	40.8	20	9 10	....	......	518
	27.9	5 8	45.8	22	9′ 10	....	......	761
	....	5 10	46.3	35	7′ 8	Quadruple or double-double. The small stars are 14 and 15 m, and stand in the respective positions 188.9 and 1.3, each with its principal star.	......	658
	29.7	6 20	46.7 191.8 7.7	20 18 15	8′ 9′ 8′ 14 9′ 15	A B A C Quadruple.. B D	......	808
3663	4 27 49.3	125 11 57	342.7	35	8 12	....	......	662
3664	4 27 53.1	115 22 48	193±	20	8′ 10′	....	......	646
3665	4 29 14.0	150 13 31	53.9	3	10 = 10	Elegant double star	......	756
	20.2	12 36	53.8	3	10 = 10	Very neat star..	......	524
3666	4 29 19.4	156 28 42	206.7	10	9′ 11	....	......	653
	21.0	28 16	204.4	15	9 11	....	......	761
3667	4 29 24.7	128 22 51	290.1	15	9 11	....	......	661

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3668	4 30 —	145 24 —	108.5	82.3	3 11	α Doradûs. Epoch 1836.006	B. 744	E
——	4 30.2 —	103 23 —	171.9	18	8′ 8′	Pos 171.5, 172.2. Place that of Struve's Catalogue for 1826.	Σ. 576	757
3669	4 31 27.6	143 12 41	308.0	12	10′=10′	....	......	525
3670	4 31 49.6	153 11 ±	95.0	30	6 8′	....	L.1551	808
	50.0	10 34	95.6	30	6′ 10	Large star, yellow; small, pale blue	......	756
	50.1	9 41	93.6	35	7 9	Δ R A = 5ˢ.0	......	524
3671	4 32 14.8	140 29 47	273.3	2½	10 10′	....	......	526
	16.5	29 55	278.8	4	11 12	Haze coming on	......	744
3672	4 32 26.3	125 39 1	289.0	4	8′ 10	Pos 285.9, 290.3, 290.9. Neat *	......	663
	29.2	38 28	297.6	3	9′ 11	10° error no doubt committed in the micrometric reading.	......	801
3673	4 32 31.1	168 2 53	61.7	12	7′ 8	Fine star. Pos 62.9, 60.9, 61.3..................	L.1584	670
	36.4	2 35	62.1	12	8′= 8′	Fine. Pos = 63.5, 60.8........................	......	747
	....	3 44	59.3	13	8′ 8′	Pos 59.9, 58.8; Δ R A = 3ˢ.2. This obs by some unaccountable error gives the R A 32ᵐ 5ˢ.1.	......	746
3674	4 32 53.4	127 39 49	205.3	30	8 12	....	......	661
3675	4 33 1.6	134 58 34	51.4	40	6′ 12	....	L.1547	639
3676	4 33 29.9	157 54 7	184.9	9	8′ 12	....	......	760
3677	4 33 44.4	119 54 12	174.1	6	9 = 9	....	......	644
	44.5	54 21	174.1	10	9′ 9′	....	......	511
	45.9	54 36	173.7	8	9′= 9′	Pos 173.9, 173.9, 173.3	......	645
	49.7	54 33	173.8	8	9 = 9	....	......	643
3678	4 34 —	135 22 —	327.2	41.7	8 10	Mean epoch 1836.479..........................	......	E
3679	4 34 47.6	152 25 3	350±	20	7 12	Large star very high red, a rich * fine colour, almost sanguine. Pos estimated from the diagram.	L.1567	756
——	4 35 25.5	99 7 4	138.5	12	8 = 8	Pos 138.8, 138.3. Fine star.	Σ. 590	758
3680	4 36 23.5	142 12 59	21.4	6	10′=10′	....	......	525
3681	4 36 55.3	137 30 7	262.9	35	6′ 12	....	L.1572	527
3682	4 37 0.5	156 27 6	15±	25	8′ 14	....	......	761
3683	4 37 30.4	149 16 59	260.8	3	8 = 8	Very fine. Pos 260.6, 261.1....................	L.1583	518
	32.9	17 9	261.5	3	7 7	Pos 261.1, 261.9; very fine, but ill defined........	......	665
——	4 37 54.0	102 16 15	281.1	10	8′ 11	Too late for a good measure	Σ. 596	759
3684	4 38 48.9	158 2 19	294.8	15	9′ 12	....	......	760
	52.7	3 2	294.5	12	9 13	Presuming a mistaken wire, without which the R. ascensions of the two observations are irreconcilable.	......	759
3685	4 39 30.8	133 43 14	125.6	20	9 10	....	......	639
3686	4 39 34.9	151 32 6	213.8	6	9 = 9	Elegant; Pos 35.1, 32.5, 33.8	......	524
	36.9	32 7	217.6	8	9′ 9′+	Pos 217.2, 218.0, a very little unequal............	......	756
3687	4 39 40.9	99 0 7	282.8	25	9 11	....	......	758
3688	4 39 45.4	144 14 31	143.1	10	10 12	....	......	521
3689	4 40 3.2	155 38 15	60.3	12	9 12	....	......	808
3690	4 40 35.9	102 3 49	45± 195±	18 30	8 14 8 11	Triple. Pos of the small star estimated from the diagram.	......	757
3691	4 41 31.6	167 11 27	42.0	50	7′= 7′	....	......	746
3992	4 42 59.3	173 15 10	181.7	60	6 12	Very ill defined	L.1707	668
3693	4 43 3.6	102 32 9	116.3	4	10 12	....	......	757
3694	4 44	135 27 —	62.3	5.8	8 10	Mean epoch 1836.483..........................	......	E
3695	4 44 37.5	128 52 8	41.3	40	7′ 12	....	M 1726	661
3696	4 44 39.0	146 18 34	265.7	2	9″ 10	Very delicate; Pos 265.7, 265.8	......	520
	39.1	18 51	265.7	1¾	9′ 10′	....	......	521
3697	4 44 43.8	131 36 45	284.6	15	6′ 10	Fine star; Pos 284.9, 284.3	M 1727	638

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3698	4 45 6.7	128 29 52	290.8	10	9 13	....	......	801
3699	4 45 38.0	135 57 51	141.5	5	7′ 13	....	......	527
3700	4 45 51.3	111 3 6	345.3	20	7′ 14	....	......	647
	52.7	3 18	348.3	18	6′ 13	....	......	652
3701	4 46 56.8	147 45 31	130.3	12	9′ 13	....	......	760
3702	4 47 —	115 26 —	221.0	21.0	9 10′	(Nisi P D = 105 26). Epoch 1836.956	......	E
——	4 47 8.0	143 45 27	53.0	15	8 8+	Fine star. Pos 53.3, 52.6 (ι Pictoris)	B. 810 + 811	525
	8.7	44 52	54.7	12	6′ 7	Fine; Pos 57.2, 52.7, 54.3	Δ 18	521
	9.6	45 18	56.7	15	7 8	Pos 56.2, 57.6, 56.3	......	807
3703	4 47 29.2	152 10 21	300.0	5	9′ 12	....	......	524
3704	4 48 44.0	131 42 16	209.8	12	10 12	....	......	804
3705	4 49 10.0	106 24 55	139.3	16	7′ 10	Neat star	......	651
3706	4 49 58.4	147 28 25	281.1	25	8′ 13	....	......	665
3707	4 50 28.0	150 1 46	264.3	3	9 13	Very delicate; attached to a nebula	......	524
3708	4 52 ±	177 52 ±	36.8	15	10 10′	Δ R A = $47^s.5$; the R A may be many minutes wrong, as I could get no zero stars.	......	761 (bis)
3709	4 52 29.7	109 4 40	318.4	20	9 11	....	......	652
——	4 53.0 —	103 36 —	104.3	4	8′ 10	Pos 104.9, 103.8; elegant. Place from Struve's Catal. for 1826.	Σ. 601	757
3710	4 53 21.4	157 11 1	85.9	8	9 11	Chief of a cluster	......	522
	21.5	11 45	83.9	10	12 13	Chief of a cluster............................	......	653
	21.7	11 40	83.3	5	10 12	Chief of a cluster of 7th class..................	......	658
3711	4 53 27.1	131 11 8	350.1	9	8 13	....	......	638
3712	4 53 50.3	158 55 9	148.8	1½	14 15	Forms the nucleus of a small nebula	......	512
3713	4 53 56.9	133 26 52	338.7	30	8′ 10	....	......	804
3714	4 54 14.1	106 32 45	276.7	7	11 = 11	....	......	651
3715	4 55 3.7	139 43 10	111.7	12	7 10	Pos 111.7, 111.8............................	B. 843	744
	4.3	42 40	111.0	10	8 9′	....	......	526
3716	4 56 15.0	156 43 56	......	..	......	A very close double star in a cluster..............	......	761
	19.1	43 45	......	..	......	In a cluster	......	657
3717	4 56 22.6	129 49 16	196.9	10	10 11	....	......	638
3718	4 56 24.3	126 23 28	166.1	30	8 9	....	......	663
3719	4 58 12.2	157 29 36	250±	2	......	Nebulous....................................	......	512
3720	4 58 30.5	105 40 30	149.6	20	8 10	....	......	651
3721	4 58 51.5	170 55 12	216.9	2½	8 9′	Very neat star; Pos 216.7, 216.5, 217.6	......	670
3722	4 59 15.2	164 32 25	146.8	20	9′ = 9′	Has a pretty large faint nebula attached to it......	......	514
3723	4 59 26.7	109 59 12	54.3	4	9 10	Very ill defined	......	652
3724	4 59 31.2	146 2 15	272.3	1½	10 = 10	Very neat double star..........................	......	520
——	5 0 10.5	98 53 38	84.6	25	7′ 10	Large star, white; small, very ruddy	Σ. 649	758
3725	5 1 23.7	129 52 38	140.8	30	9′ = 9′	....	......	754
3726	5 1 40.8	135 53 29	66.8	15	9 9	....	......	805
3727	5 3 2.3	109 6 40	32.3	2	9 10	Not well defined. Pos bad	......	652
3728	5 3 3.2	131 27 4	255.0	12	6 11	Fine; Pos 254.3, 255.3	B. 881	628
	....	....	262.2	14	6′ 11	Pos 262.7, 261.7. Micrometer set to 255°. The error is so very great that I can hardly suppose it to have been committed. No doubt the microm. must have been read 10° wrong in ʃ 628.	M 1861	754
3729	5 3 12.9	135 3 4	231.8	10	9′ 10	A third star n p	......	527
	15.2	3 54	227.7	10	10 10+	....	......	639
3730	5 3 56.1	125 30 15	336.9	10	9 12	....	......	663

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3731	5 4 52.8	146 6 4	297.9	8	9′ 11	....	......	521
	54.3	6 7	301.1	12	9 11	....	......	520
——	5 5 23.3	103 8 59	359.9	2	5′ 9	κ Leporis; Pos 359.3, 0.7, 359.8	Σ. 661	757
3732	5 6 3.7	117 22 51	216.5	80	8 = 8	Both fine yellow	L.1753	511
3733	5 6 15.0	169 37 30	111.5	..	9′ 9′	Δ R A = 6ˢ.5	......	670
3734	5 6 38.6	133 5 4	200.5	10	10 10+	Neat star	......	639
3735	5 7 10.7	122 6 34	153.3	6	9′ = 9′	Pos 154.1, 154.1, 151.8.........................	L. 1759	645
	13.9	7 32	151.9	6	8 8′	Fine double star	......	644
3736	5 7 18.6	147 47 36	320.7	15	9 12	....	......	665
3737	5 7 26.5	126 15 1	303.5	15	9 12	....	......	661
3738	5 8 6.3	145 30 54	7.7	15	10 = 10	....	......	521
3739	5 8 54.2	138 5 4	277.4	2	9 9	A very neat D ✻	......	805
3740	5 9 8.5	126 50 59	284.7	30	7 8′	Fine star. Large ✻ yellow; small blue; R A by an auxiliary star, and liable to error.	L.1780	661
3741	5 9 28.1	168 31 29	115.8	..	6 10	Δ R A = 14ˢ.0; large star single, and very yellow	B. 905	670
3742	5 10 10.2	145 46 2	254.8	15	7 14	Very delicate	B. 908	521
3743	5 10 45.1	150 10 37	122.8	4	9 10′	Pos 121.9, 123.7..............................	......	756
	49.9	10 46	120.8	3	9 10	Elegant; Pos 121.7, 119.9	......	524
——	5 11 21.4	100 55 54	92.4	15	8 = 8	Pos 92.3, 92.6; fine	Σ. 688	758
3744	5 11 50.6	128 9 14	281.7	2	10 11	Very neat	......	659
3745	5 12 —	124 12 —	166.2	11	7′ 10	....	......	E
——	5 11 52.6	108 42 10	17.2	30	6 = 6	Superb star; Pos 17.3, 17.1	σ. 170	652
3746	5 12 1.4	162 16 22	262.2	3	8 8′	[Lacaille's R A is 1ᵐ greater]...................	L.1831	514
3747	5 12 36.4	157 46 1	103.7	12	9 11	....	......	522
3748	5 13 —	152 37 —	283.3	6	5′ 11	Fine double ✻ near α Reticuli	......	524
3749	5 13 1.0	120 14 43	146.6	15	10 = 10	....	......	645
3750	5 13 10.2	111 25 5	295.3	3	5 10	Most beautiful double star, but too late for a good measure.	......	647
3751	5 14 8.9	123 34 24	319.4	25	9 10	....	......	663
3752	5 14 48.3	114 57 8	100±	4	6 10	A very fine D star. Triple; the 3d is in the same exact line, 10 m, dist 30″	A. 641	530
3753	5 15 13.7	125 53 21	174.6	12	8′ 9	....	......	659
	17.1	53 26	174.4	15	9 10	Chief star of a large cluster	......	651
3754	5 16 3.0	160 8 12	134.6	18	10 = 10	....	......	751
3755	5 16 19.0	152 7 29	286.1	20	8 13	....	......	756
3756	5 16 21.3	148 55 57	170.3	20	9 11	....	......	664
	23.0	56 57	172.2	18	8 10′	....	......	665
3757	5 16 54.2	121 55 12	272.9	18	7′ 11	....	L.1827	644
——	5 17 15.5	101 28 22	193.5 88.3	12 40	9 9+ 9 13	Pos 193.1, 193.9 .... Triple	Σ. 710	758
3758	5 17 54.8	137 25 48	65.0	12	10 10′	....	......	527
3759	5 18 40.4	109 50 7	315.3	15	7 9	Pos 316.3, 314.3..............................	......	652
3760	5 19 49.1	125 29 43	221.0 271.6	10 20	6 7 6 11	Fine triple star	......	662
	51.3	30 28	217.3 268.6	10 20	7 7′ 7 11	Pos 217.3 by two coincident measures	......	663
3761	5 20 58.6	110 54 21	145.9	70	4 13	β Leporis; Δ R A = 2ˢ.5	A. 659	652
——	5 21 7.0	142 28 2	285.8	35	8′ 8′	(θ Pictoris) fine star. Δ. 20	B. 961	525
3762	5 21 33.0	122 34 2	212.7	25	6′ 13	Delicate	M2008	644
3763	5 21 23.9	133 31 25	256.2	15	8 9	....	......	804
	27.4	31 15	254.6	12	9 10	....	......	528
3764	5 23 22.3	150 15 26	271.8	6	11 13	....	......	756
	27.1	15 16	270.8	3	10′ 13	Difficult (dist probably underrated)	......	524

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ' "	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3765	5 23 25.0	109 33 40	349.4	15	10 10	....	......	652
3766	5 25 14.9	107 56 34	154.8	25	3' 12	α Leporis..	A. 673	652
3767	5 25 28.5	137 12 31	219.9	25	6 14	The following and larger of two	B. 973	527
	30.2	12 49	225.7	25	5" 12	A star 6 m precedes, making with the large ✱ the double ʃ Δ 21.	......	805
——	5 25 50.4	132 26 31	173.8	12	8 8	Pos 173.7, 173.9 [Mr. Maclear's observations give this R A the preference].	B. 976	804
	64.4	25 13	172.7	10	9 9+	Fine. [There seems to be a mistake of 10ˢ. in this R A. It is marked as double in the Brisb. Catal.]	Δ 22	528
3768	5 26 2.5	156 44 10	28.3	1½	10 11	Involved in a thick nebulous mist like dust........	......	654
	5.4	43 51	30.9	2	10 11	Forms nucleus of a bright nebula	......	522
3769	5 26 22.6	130 29 49	271.8	4	10 11'	....	......	754
	....	....	271.3	4	10' 12	Measured past merid	......	772
3770	5 26 30.8	114 27 43	10.0	12	7 13	Extremely delicate; a fine object	......	530
3771	5 28 52.4	159 15 35	72.9	3	11 13	In a cluster	......	657
3772	5 29 16.9	121 33 52	226.9	5	10'=10'	....	......	535
3773	5 29 30.3	172 27 13	275.5	15	9 10	Pos 277.0, 273.8, 275.7........................	......	668
3774	5 29 34.0	146 6 58	21±	1½	11 14	Difficult	......	520
3775	5 29 34.9	159 16 5	228.8	4	11' 12	Triple or quadruple. In a cluster, Class VII.	......	657
3776	5 30 4.2	117 32 38	162.3	30	9' 10	....	......	769
3777	5 30 —	145 1 —	349.3	51.8	6' 9'	Epoch 1834.947	......	E
3778	5 30 21.7	145 0 0	103.6	12	10 12	The large ✱ B 994, not far distant to the south	......	521
3779	5 30 25.6	157 0 50	343.5	2	10' 12	Probably close multiple, being described in ʃ 760 as a nebula.	......	658
3780	5 32 —	107 57 —	......	..	7,7,8,8,8	Quintuple 6th and 7th classes Zone Review........	......	E
3781	5 32 9.6	131 23 17	136.3	18	9 11	....	......	772
3782	5 32 52.2	131 18 2	63.5	25	10 12	....	......	772
3783	5 33 2.8	161 2 27	262.1	20	7' 10	....	......	751
3784	5 33 21.9	136 10 58	51.3	3½	7' 10	Pos 52.1, 50.6................................	L.1944	805
	37.3	11 22	48.6	2½	8' 11	Elegant. Pos 48.6, 48.7. Obs makes the minute of R A 32.	......	527
3785	5 33 30.9	104 21 39	120.9	20	10 10	....	......	757
3786	5 34 1.3	143 35 55	92.6	12	10 11	Has a ✱ 7 m, 3' south	......	765
3787	5 34 24.3	144 40 31	243.3	30	8 10	....	......	521
	24.4	39 56	241.5	30	8 10	....	......	520
3788	5 34 27.8	116 26 28	151.3	25	7' 9	....	L.1946	530
3789	5 34 50.3	140 13 0	1.1	10	9 9'	Fine star	......	762
3790	5 35 4.6	157 0 10	180±	..	9	The second of 2 stars 9 m, the chief of the great clustering region of the Nubecula Major.	......	658
3791	5 36 1.9	110 45 32	54.8	8	8 9'	A neat double star	......	652
3792	5 36 8.2	149 10 27	148.8	18	9 12	A star 7 m 3' sp and one 6' m, 6' n f..............	......	664
	10.0	9 42	145.7	15	8 12	....	......	665
3793	5 37 2.4	138 19 50	102.8	12	7 11	Very fine object	L.1972	762
3794	5 37 44.1	124 1 59	266.3	25	7 13	Chief star of a cluster..........................	L.1967	663
3795	5 38 38.9	166 27 9	67.3	60	5 12	Δ R A = 13ˢ.0 (γ. *Montis*)........................	L.2037	746
3796	5 39 53.4	159 11 22	180±	9	8' 14	Septuple, or multiple. The chief star in the centre of the great looped nebula in the Nubecula Major	B.1038	653
			304.3	12	13			
			44.4	12	14			
			359.3	18	13			
			44.4	20	13			
			132.8	25	12			
3797	5 40 —	136 22 —	175.4	50.5	8 9	Mean epoch 1836.009	......	E
3798	5 40 13.4	114 33 19	65.9	20	9 9	....	......	640
	13.6	34 3	64.6	18	8 9	Pos 63.0, 66.3................................	......	530
——	5 40 39.9	103 25 28	120.9	20	10 10	[Struve's magnitudes are 7, 10].	Σ. 801	757
3799	5 41 1.5	108 45 58	149.5	2½	9 9'	A very elegant double star......................	......	652

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3800	5 41 28.5	146 56 24	227.8	6	11 12	Has a star 8 m, 3′ south	......	665
3801	5 41 44.8	136 39 42	193.3	30	5″ 14	Very delicate	B. 1043	805
3802	5 42 5.6	145 47 23	304.1	4	8′ 11	......	M. 2172	520
3803	5 42 —	134 55 —	114:	20:	7 10	1836.975 mean epoch	......	E
3804	5 43 38.5	102 49 36	50.6	10	9′ 12	......	......	757
3805	5 44 40.2	133 33 25	125.8	4	9′ 11	......	......	528
	40.4	33 36	129.5	5	10 10′	......	......	804
3806	5 45 7.3	129 30 1	114.5	12	10′=10′	......	......	772
3807	5 46 15±	131 43 50	267.3	4	7′ 13	A very fine object. The R A is only a rough approximation.	......	772
3808	5 46 47.2	147 41 8	309.0	3	11=11	......	......	665
3809	5 47 —	176 24 —	224.3	12	9′ 12	Δ R A = 14ˢ.5. R A may be several minutes wrong, as I could get no zero stars in this *f*.	......	761 (bis)
3810	5 47 9.7	151 10 59	170.3	30	9 11	......	......	756
3811	5 47 27.0	115 13 46	245±	20	8′ 9	Pos estimated from the diagram	......	646
3812	5 47 28.5	149 53 42	189.5	2½	9 10	Pos 189.3, 189.8; the first measure with power 320	......	664
	....	....	......	..	......	Seen as described, no particulars	......	764
3813	5 47 54.3	157 48 32	313.6	30	8 13	......	......	759
3814	5 47 55.7	164 55 32	174.1	3	10=10	Neat star; Pos 174.3, 174.0	......	746
3815	5 48 28.5	155 54 56	140±	40	10=10	Pos estimated from diagram	......	761
3816	5 48 39.9	137 59 47	177.9	25	7 13	......	B. 1080	527
	40.9	59 28	178.3	20	7 13	......	......	526
3817	5 49 21.4	170 26 54	229.0	20	9 10	......	......	668
3818	5 50 34.7	117 20 43	169.3	15	9 12	......	......	769
3819	5 51 29.5	125 18 19	104.4	30	4 14	(γ *Columbæ*) delicate, bears a little illumination	A. 746	662
3820	5 52 39.3	159 56 37	96.3	35	7′ 10	[*This pos is corroborated by diagram*]	L. 2116	751
	40.0	55 55	......	..	......	No description	......	748
	40.1	56 25	111.3	30	7 10	[*This pos inconsistent with diagram*]	......	657
——	5 53 22.7	104 32 10	86.0	25	9 11	......	Σ. 832	757
3821	5 53 36.1	111 0 27	212.0	25	9 9′	......	......	647
3822	5 53 36.1	143 26 45	304.3 133.4	70 20	6′ 7 7 13	A and B B and C	L. 2104	765
	37.5	26 52	304.5 136.6	60 15	7′ 8 8 13		......	525
3823	5 53 58.9	121 3 39	131.5	3	9 = 9	Pos 132.8, 130.3. Both stars orange, or even red; very decided colours. (Compare this with the next observation.)	......	535
	60.7	3 30	131.8	3½	9 = 9	Pos 133.3, 130.4. Both stars pale yellow	......	645
3824	5 54 33.5	140 24 25	273.1	5	10 14	......	......	762
3825	5 55 22.1	117 25 43	342.8	25	7′ 11	Another similar, n p	L. 2107	531
3826	5 55 35.8	131 28 54	149.1	12	10 13	......	......	772
	39.5	27 40	151.3	20	10 12	......	......	754
3827	5 56 21.2	131 10 3	242.3	30	9′ 9′	......	......	772
3828	5 56 36.4	143 55 14	132.5	15	9 10	......	......	520
	36.6	54 58	133.7	12	10 11	......	......	521
3829	5 56 53.0	152 46 21	353.8	15	9 12	......	......	524
——	5 57 9.3	104 21 25	126±	8	10 11	......	Σ. 843	757
3830	5 58 44.5	118 39 43	1.7	8	9 = 9	Elegant double star. Pos 1.1, 2.3	......	769
	46.0	40 48	1.5	4	8′= 8′	Elegant. Pos 2.6, 0.5; dist probably under estimated	......	531
3831	5 58 49.3	131 9 8	138.2	3	9 = 9	Pos 138.2, 138.3; micrometer set to 134.5 the measure cannot be borne.	......	772
	52.5	9 9	134.5	2	9 = 9	Pos 135.2, 133.7; elegant star	......	754
3832	5 59 9.5	123 16 23	146.9	15	9′= 9′	......	......	662
3833	5 59 26—	113 5 —	......	..	6 11	Class 5, zone review	......	E

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3834	5 59 46.7	135 4 38	245.9	1¼	6 10	247.5, 244.3 Power 320; very fine ✱	B.1132	805
3835	6 0 6—	113 7 —	......	..	8 11	Class 4, zone review	......	E
——	6 0 20.0	138 26 30	343.5	2½	7 7′	Superb double star. Pos 342.6, 344.5	Δ. 23	762
3836	6 2 32.2	139 54 5	294.1	6	10 10	....	......	526
3837	6 2 55.3	145 56 53	14.1 286.1	12 12	8 13 8 12	Triple	......	521
——	6 4 19.3	103 6 2	331.4	5	9′ 10′	Pos 330.5, 332.3; L red S very green	Σ. 875	757
3838	6 4 47.2	154 58 53	306.4	4	11=11	....	......	539
3839	6 6 14.7	108 16 16	......	..	......	Strongly suspected to be double		677
3840	6 8 25.6	120 27 28	229.7	8	10=10	....	......	535
3841	6 8 31.1	148 27 13	165.8	4	10 12	....	......	518
3842	6 8 32.5	112 8 49	215.1	18	10 10′	....	......	768
3843	6 9 18.6	150 17 5	324.7	15	9 9′	....	......	756
	21.2	17 31	321.6	15	8′ 11	....	......	664
3844	6 9 22.6	159 39 35	90.7	8	9 13	A third more distant	......	657
3845	6 9 54.6	112 39 20	51.3	25	8 12	Large star, ruddy	......	532
	54.7	39 13	51.7	25	6′ 12	....	......	768
3846	6 10 0.4	139 2 45	67.3	3	9 10	....	......	762
3847	6 11 25.0	104 27 51	48.3	6	8 12	Neat star	......	676
——	6 11 44.9	155 29 17	114.2	25	7′ 8′	Marked as "double" in Brisb. Cat.	B.1201	518
	46.6	29 28	112.1	20	8′ 9	(? ? if Δ. 26)	......	639
	48.0	29 8	112.8	25	8′ 9	Δ R A = $4^s.0$	......	515
3848	6 12 11.8	136 59 34	318.6	3	9′ 9′	Pos 320.3, 3	......	527
	13.3	59 3	323.8	4	10=10	....	......	544
——	6 13 56.3	149 8 5	223.6	90	6′ 7	— Possibly = Δ. 27	B.1211	764
3849	6 14 14.7	129 19 43	50.6	45	7′ 10	Large star, yellow. [*If this be, as I suppose, identical with the star measured with the equatorial the P D in this obs must have been misread 5′.*]	......	772
		25 :—	52.3	39.4	7 7′	....	......	E
3850	6 14 26.7	104 31 29	43.3	10	9 13	....	......	676
3851	6 15 35.5	151 33 51	80.7	15	9′ 11	....	......	756
3852	6 15 43.0	134 43 29	6.3	3	9′ 11	....	......	528
——	6 16 29.5	102 52 23	296.3	25	7 11	....	Σ. 903	757
	29.8	52 28	287.8	15	7′ 12	....	......	676
3853	6 16 55.2	132 17 3	77.0	12	9 11	....	......	804
3854	6 16 59.4	144 26 13	128.8	10	9′ 11	....	......	521
	62.5	26 3	128.1	12	9 12	Large star, ruddy	......	767
3855	6 17 49.9	164 26 55	82.3	6	10=10	An elegant double ✱. A third ✱ near	......	672
3856	6 18 4.1	135 32 9	4.8	30	7 10	....	L.2267	544
3857	6 18 18.3	126 37 11	257.6	12	7′ 12	A third ✱ 9 m, exactly in the line	B.1229	540
	19 ±	38 ±	261.3	12	6 13	Viewed past merid. The three stars are positively *not* in a straight line. The 3d star 7′ m. This obs makes the degree of P D 127, but as it was looked for and found by 126, that must be the true degree.		801
3858	6 19 34.1	123 56 6	313.8	3	7′ 8	Pos 314.7, 312.9. Fine object. A star 6 m precedes to the south.	L.2274?	663
3859	6 19 40.8	116 43 28	252.9	15	9 9′	....	......	530
3860	6 20 19.2	130 52 41	223.0	12	7′ 12	Pos 223.3, 222.6	L.2284	772
	22.2	52 28	223.9	7	9 10	....	......	529
3861	6 20 51.2	148 5 51	58.3	2	9′=9′	Neat star; R A precarious	......	664
	....	....	61.1	2	9′ 9′	A beautiful D star; past merid.	......	764
3862	6 21 39.5	157 30 11	276.9	12	8 11	....	......	522
3863	6 22 18.6	112 29 35	121±	2	6′ 9	....	......	768
3864	6 22 48.7	104 51 5	43.3	20	7′ 12	....	......	676

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3865	6 22 51.4	107 42 43	64.3	18	9′ 11	......	......	675
3866	6 23 21.8	114 2 10	112±	3	8 12	......	......	532
3867	6 24 20.5	138 24 20	278.6	30	9 11	......	......	762
3868	6 24 37.7	165 7 18	141.7 51.8	18 25	7 13 7 14	A B } A C } Triple. Sky dull	......	547
3869	6 26 11.5	121 54 47	249.3	25	7′ 9	......	L.2330	678
	19.6	54 33	250.0	30	6′ 9	......	......	645
3870	6 26 40.1	165 1 40	13.8	25	8 13	......	B.1274	672
	43.6	1 30	11.4	18	7′ 13	......	......	671
3871	6 27 32.1	119 29 43	353.1	10	7′ 8	A fine double star	L.2337	769
3872	6 28 10.1	169 53 43	25.1	19.4	10 10	Distance by oblique transits	......	670
3873	6 28 30.5	147 29 7	......	..	9 10	Class III.	......	764
	34.4	29 15	289.6	18	8 12	Blotty	......	665
——	6 28 54.9	108 31 20	260.9	20	7 8′	*ν Canis Majoris.* IV. 81	σ. 237	677
3874	6 29 25.0	148 37 51	224.5	3	6 12	Pos 226.3, 222.6. Power 320	B.1292	764
	25.5	37 39	232.0	2½	6 12	Pos 232.5, 231.5; (*μ Pictoris*)	......	664
3875	6 29 28.2	126 38 57	297.3	20	6 13	Very neat star	B.1291	809
	31.7	38 24	292.8	18	6 13	Pos by MS 222.8, but this contradicts a diagram made at the time.	......	801
3876	6 29 31.8	112 28 30	326.6	15	8 12	......	......	534
	33.4	28 56	338.5	15	8 11	Triple. A 3d star, 14 m dist 25″	......	768
3877	6 31 19.3	112 53 32	351.1	12	9 9	......	......	533
	21.1	53 35	350.7	15	8′ 9	......	......	532
3878	6 31 31.9	125 48 13	12.4	8	11 12	One of a small group	......	663
3879	6 31 54.1	160 29 40	97.5	12	10=10	......	......	545
	56.0	29 40	95.4	18	9=9	Δ R A = 3s.0	......	523
	56.2	29 49	102.4	15	10=10	Well defined	......	673
3880	6 32 29.9	156 8 11	262.0	2	11=11	Elegant D star. Pos 261.1, 262.8	......	538
3881	6 33 28.2	130 27 4	157.3	30	8 12	......	......	754
3882	6 33 46.2	134 54 35	332.5	20	7′ 11	The preceding of two	......	544
3883	6 33 58.7	134 53 50	56.8	5	10 11	The following of two	......	544
——	6 34 5.9	138 4 37	316.8	20	6 9	V *Puppis*, L yellow, S fine blue. Pos 316.2, 317.3	B.1320	527
	7.3	4 5	321.8	20	5′ 8	L pale yellow, S pale blue. Pos 321.7, 321.9 .... [N.B. The equatorial measures make the pos 321.8 as much as 4° wrong, therefore, probably, there has been a mistake of 5° committed in reading the micrometer in this obser.]	+1321 Δ. 31	762
3884	6 34 17.0	145 12 3	275.7	25	7 12	Large star, red	L.2408	766
——	6 36 28.5	128 13 25	279.3	10	6′ 7	Obs makes the minute of P D = 8, but there can hardly be a doubt of identity between this * and that of ʃ 659, one or other being 5′ misread.	L.2418 Δ. 32	801
	35.5	14 19	274.5	8	7′ 8	Fine star. Pos 274.8, 274.3. [There is no doubt by the agreement of the P D with Lacailles that this obs is correct in P D. It was twice found in the equatorial by this P D.]	......	659
3885	6 37 17.5	159 56 55	174.0	4	9′ 12	Pos 175.2, 172.8	......	673
3886	6 37 45.5	152 38 41	341.0	12	9 11	A third star, 10′m, s f	......	524
3887	6 37 56.6::	132 22 54	257.1	3	10 11	......	......	528
3888	6 38 59.3	168 46 6	113.4	..	7 11	Δ. R A = 10s.5	L.2502	670
3889	6 39 —	140 17 —	266.1	42.8	6′ 8′	Mean epoch 1836.495	B.1340	E
3890	6 39 26.2	162 37 15	36.9	12	9′ 12	......	......	672
3891	6 39 —	120 47 —	222.0	5.0	6 10	Mean epoch 1838.018	M.2677	E
3892	6 41 21.1	170 56 22	32.9	20	9=9	Pos 33.7, 32.1, Δ R A = 8s.0	......	667
	23.5	57 33	31.1	18	9=9	......	......	666

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3893	6 41 31.4	127 44 21	280±	..	......	Coarse, very unequal	A. 845	659
	31.7	45 3	290±	60	5′	Pos by estimation from diagram	......	661
3894	6 41 56.3	155 34 8	212.7	20	8 12		......	515
3895	6 42 7.8	137 37 36	60.8	25	7′ 11	L orange, S contrasted B	B.1361	527
	8.6	37 10	62.3	25	8 10	Glimpses of a 3rd star strongly suspected—dist 12″ Pos 0°.	......	544
	10.0	37 25	64.3	40	7′ 10	L orange, S blue	......	762
3896	6 44 24.1	118 31 38	163±	15	10 10		......	769
	24.6	32 8	161.0	8	9 = 9	A star 8′ m, 3′ n p	......	531
3897	6 45 30.1	133 28 43	79.3 :	15	9 14	Very delicate, Power 320, R A missed and determined by an auxiliary ✱, therefore precarious.	......	528
——	6 46 33.4	104 1 35	275.5	1½	10 = 10	A delicate and beautiful D star. Pos mean of 275.3, 275.7.	Σ. 990	757
3898	6 47 49.3	146 2 24	306.8	18	9 9		......	521
3899	6 47 55.5	170 28 33	310.8	6	10′ 12		......	670
3900	6 47 59.8	124 0 44	284.7	2	6 11	Fine and delicate	L.2520	809
——	6 48 19.1	103 49 53	339±	2	4′ 10	*μ Canis*. Just time to apply the triangular aperture, but not to measure the position. Most beautiful.	Σ. 997	676
	20.5	50 14	337.2	2	6 9	Pos mean of 337.3, 337.1. Beautiful object	......	757
3901	6 49 11.1	127 17 50	218.8	20	7 11		......	801
——	6 49 24.5	112 25 24	43.0	20	8 9		S. 541	768
3902	6 49 56.1	108 7 59	49±	10	10 10		......	675
3903	6 50 2.8	174 58 12	235.8	15	9 12	Pos 239.3, 232.3	......	666
3904	6 50 17.0	164 2 25	103.6	4	10′ 12		......	672
3905	6 52 11.1	125 12 3	268.3	15	9 12		......	541
3906	6 52 35.0	145 22 12	38.7	18	9 = 9		......	521
	38.5	22 3	220.5	20	8′ 9	The obs gives $53^m\ 33^s.3$ for the R A. Either the wire has been mistaken in this, or the minute in one of the two observations. The former is presumed to have been the case.	......	520
3907	6 53 2.7	127 30 28	227.1	20	9′ 12		......	661
3908	6 53 8.3	105 5 11	297.1	3	10 = 10	Neat star	......	676
3909	6 53 17.9	137 11 49	273.3	8	9′ 11		......	544
3910	6 53 19.5	155 42 26	60.9	30	9 12	Δ R A = $4^s.75$	......	766
3911	6 54 24.8	166 38 30	43.2	19.6	7 12	Δ R A = $5^s.0$; dist by oblique transits	B.1436	671
3912	6 54 29.2	140 27 45	47.7	6	11 12		......	762
3913	6 54 40.3	118 47 57	128.7	6	9′ 10		......	531
3914	6 55 1.8	113 15 30	315.6	12	7′ 13	Two more bright stars in field	......	534
3915	6 55 5.8	155 44 1	267.2	20	8′ 13		......	766
3916	6 55 17.9	120 53 23	102.3	5	10′ = 10′		......	678
3917	6 55 22.9	120 31 52	96.7	4	9′ 10		......	535
3918	6 56 57.2	158 15 12	318.8	6	11 12		......	538
3919	6 57 17.9	125 4 30	268.3	15	9 12	[Pos probably misread 10°]	......	541
	18.6	4 19	255.4	15	8′ 10		......	809
3920	6 57 39.1	138 45 15	106.9	5	9 9	Pos 106.5, 107.3, 106.6; micrometer set to 103, the measure of *f* 526; it cannot pass; I suspect this star to have changed.	......	762
	40.5	44 43	102.7	2½	9′ 9′	Fine star. Pos 104.1, 101.3 ::	......	526
3921	6 57 45.8	148 9 19	270.4	8	8 12		L.2613	664
3922	6 57 59.1	150 37 27	236.9	15	8′ 12	The preceding of two D star, in a rich field	......	756
	65.7	37 28	232.1	15	7′ 13		......	682
3923	6 58 0.6	119 26 22	197.8	12	9 10	A third, 9 m, n f	......	531
3924	6 58 13.8	150 37 12	353.8	20	9′ 10	The following of two D stars, in a rich field	......	756
	18.8	37 22	357.7	18	11 11′		......	682

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3925	6 58 24.3	136 39 31	105±	1	11 11	In the best moments with power 320, satisfied of its being double; but the definition to-night is bad, and my eyes are inflamed with a cold. Should be re-examined.	......	527
3926	6 58 45.6	166 55 2	288.6	..	10 10′	Δ R A = 7ˢ.0	......	671
3927	6 59 4.4	164 3 15	21.3	20	9′ = 9′	....	......	672
3928	6 59 24.4	124 31 28	158.8	5	5′ 7	2 other companions n p and s f	L.2612	809
	....	33 ±	154.4	3	8 9′	2 others near on opposite sides, seen too late for taking place directly.	......	541
3929	6 59 33.9	161 48 3	238.7	12	9 11	....	......	673
	36.1	48 2	227.3	12	8′ 10	....	......	523
	39.5	48 5	236.9	10	9 12	....	......	672
3930	7 0 28.7	102 54 22	73.8	12	10 10′	Chief of a cluster of 7th class	......	676
——	7 0 38.2	148 55 41	76.2	2	7 7	Fine ∗; Pos 74.8, 77.4, with 320 and triangular aperture.	B.1475	664
	38.2	55 29	78.5	2	7 7′	Pos 77.9, 79.3	Δ. 39	764
——	7 0 47.9	103 43 18	{ 254.7 { 351.8	3 12	9 9′ 9 14	Pos 253.3, 256.1 } Triple .... Pos 352.6, 351.1 }	Σ. 1031	757
3931	7 1 —	132 4 —	40.9	72.9	7 8	Mean epoch 1836.001	B. 1473	E
3932	7 2 4.9	167 32 50	276.5	6	8′ 12	Small star, reddish, or purple	L.2689	671
	33.4	31 58	276.5	8	8 10	[The obs gives R A 4ᵐ 32ˢ.1, but if a mistake of wire be allowed it comes out as here set down. No doubt of identity of the stars with each other, or with L. 2689.]		548
3933	7 2 43.6	109 29 17	153.1	10	9 12	....	......	677
3934	7 4 5.6	111 32 15	229.5	12	8 9	....	......	532
	8.1	31 25	238.3	12	8 9	....	......	768
3935	7 4 42.2	139 42 22	96.6	30	9 10	....	......	680
3936	7 5 24.3	163 29 3	266.3	3	11′ 13	....	......	547
3937	7 6 19.1	150 24 48	29.1	2	10′ 10′	Pos 27.9, 28.7, 30.8	......	682
3938	7 6 38.3	112 36 59	252.6	18	7′ 8′	....	......	768
3939	7 6 39.3	107 40 48	246±	8	10 10	....	......	675
3940	7 6 39.8	120 41 1	95.4	12	9 12	....	......	535
——	7 6 56.2	145 18 16	41.7	5	8 = 8	Pos 41.7, 41.8; both yellow. [Noticed also as double by Rumker]—No. 5 of his list. Is also Δ 41.	B.1507	520
3941	7 7 1.3	150 6 59	313.8	½	8 8	Pos 312.6, 315.1; exclusively close. I think this is the closest double ∗ I ever have had fairly separated with 320 and the triangular aperture. With this aperture, however, 180 shows symptoms of its being double.	B. 1508	764
	1.4	6 24	310.0	¾	8 9	Pos 309.3, 310.7, 307.1. The first measure taken with 320 and 9 inches aperture; the second with 480 and do., the last with 800 and do. With 1200 and the whole aperture, the angle obtained was 305.3, but the measure was uncertain, as I could not illuminate the field sufficiently to see the wires well. With this last power and aperture, dist = 1½ diam. of large star. Had not attention been excited by the beautiful double stars occurring earlier in the *f*, I do not think this would have been detected (as it was) with 180. It was a mere suspicion.	......	664
3942	7 7 25.3	123 22 52	31.3	2½	11 = 11	....	......	541
3943	7 8 19.5	134 21 59	210±	..	5′	Pos estimated from diagram. S ∗ distant, and very small.	B.1520	528
3944	7 8 30.2	152 44 26	284.1	20	9′ 12	A third, 11 m more distant; Pos 276 ±	......	766
3945	7 9 28.7	113 1 40	70±	30	7 8	Large star, orange; small, pale blue	......	532
	28.8	0 47	63.0	40	7 8	L very high yellow, S contrasted blue	......	768

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
——	7 10 9.2	160 13 20	297.0	20	5′ 7	γ. *Piscis Vol.* Pos 297.0, 297.1. Fine..........	B.1530	546
	9.7	13 12	296.9	25	5 6	Δ R A = 3ˢ.0. Pos 297.1, 296.8, 296.9	Δ. 42	523
	10.2	13 5	299.7	18	5′ 7	Superb double star..........................	......	545
	13.8	13 13	300.3	25	5 6	Pos 300.9, 299.7; superb ✻	......	673
3946	7 10 40.0	122 57 40	286.1	2	11 12	....	......	541
——	7 11 7.3	126 48 50	211.8	70	3 8	L yellow, S blue (π Argus = Δ. 43)	B.1536	659
3947	7 11 35.1	135 56 18	270.3	10	8′ 10	....	......	544
3948	7 11 40.0	114 33 48	{ 85.8 { 73.3	8 15	5′ 11 5′ 12	A B } Triple; chief of a fine cluster .... A C }	A. 905	530
3949	7 11 58.0	120 29 22	79.9	2	8 9	Fine double star............................	B.1542	678
	59.5	29 49	80.0	2	8′ 9	....	......	535
3950	7 12 6.9	111 43 55	168.3	3	9′ = 9′	Fine double star............................	......	768
3951	7 12 12.6::	140 42 24	67.6	4	10 11	Both red; R A very precarious..................	......	680
	18.2	41 19	65.3	8	9′ 11	This R A to be preferred	......	525
3952	7 12 23.3	143 44 52	271.3	15	8′ 12	....	B.1547	520
3953	7 14 40.3	163 38 45	323.1	15	9′ 12	....	......	547
3954	7 15 9.6	122 41 37	92.3	8	9′ 11	....	......	534
3955	7 15 12.0	155 54 19	27.7	25	9 10	....	......	766
3956	7 16 5.3	138 12 31	164.2	8	9 11	The preceding of 2; R A ill taken .... [*The place agrees with that of* Δ. 45, *but it cannot be the star observed by him.*]	B.1576	553
	11.1	12 13	163.7	4	9 10	....	......	526
3957	7 16 7.5	125 36 7	195.5	15	8 9	Fine star	......	809
	9.0	35 27	194.4	15	8 9	Fine. Pos 193.8, 195.0	......	541
3958	7 16 —	141 53 —	......	..	......	Double nearly in parallel	......	E
3959	7 16 13.6	164 19 10	200.8	15	8′ 12	....	......	547
——	7 16 15.2	142 0 25	13.5	15	7 7′	Points to a coarse D star, 7′ or 8′ dist. [Noticed as double by Rumker, No. 6.]	B.1578	525
3960	7 16 —	138 14 —	......	..	8 11	Class 3, zone review. The preceding of two.......		E
——	7 16 34.2::	138 12 33	156.8	25	8 9	All the R As of this *f* are bad. [*The following of two double stars: marked as double in* B.]	B. 1582	680
	38.3	13 7	158.6	25	7′ 9	....	+1583	553
	42.7	12 30	156.5	20	8 9	....	......	526
3961	7 17 12.1::	147 21 32	248.8	10	9 12	One of a group of about a dozen	......	697
3962	7 17 38.7	146 27 39	104.7	7	8 10	....	......	520
3963	7 17 38.8	133 26 9	257.5	3	10 11′	....	......	804
3964	7 17 46.3	110 41 21	150±	4	10 10	The first and chief of a cluster of 8th class. Pos estimated from diagram.	......	768
3965	7 17 47.6	125 31 0	307.2	25	6 13	....	L.2790	809
3966	7 18 46.2	126 57 27	137.8	10	7′ = 7′	Fine star..................................	L.2801	659
	46.7	56 49	140.6	10	7 7′	Pos 139.3, 142.0	......	661
3967	7 19 22.8	145 14 56	137.6	25	7 15	A third star, 8 m prec.	B.1602	552
3968	7 20 19.8	131 45 55	127.7	25	7′ 12	Large ✻ orange	......	804
	26.8	47 18	130.6	30	7 11	Large star, very red. [N. B. Both Right Ascensions re-examined and found correctly reduced.]	......	554
3969	7 20 57.7	123 58 43	224.8	20	8′ 9	....	L.2815	841
3970	7 21 0.5	135 17 23	272.3	2	9 11	....	......	544
3971	7 21 26.9	147 35 35	189.3	18	9 12	A 3d ✻ 12 m near	......	764
——	7 22 22.7	121 30 29	50.4	15	7′ 8	Fine (is Δ. 49.)	B.1622	535

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3972	7 22 28.6	152 11 53	44.9	18	10 11	....	......	682
	29.5	11 16	44.3	20	9′ 11	....	......	681
	30.5	12 6	39.5	25	8′ = 8′	A third star 13 m make an obtuse angled and nearly isosceles triangle with these two. It does not appear to have been noticed in either of the other observations, in which the star must have been ill seen, as is evident by the magnitudes affixed.	......	524
——	7 23 48.3	132 57 16	76.2	20	5 10	Pos 77.0, 75.5; L yellow, S very fine blue........	B. 1631	804
	50.0	57 47	73.6	30	5′ 9	L yellow, S blue; Δ R A = 2^s ± (*σ Argus*)	Δ. 51	528
3973	7 24 25.9	110 34 40	36.3	8	9 10	L pure white, S a very remarkable brick red	......	677
——	7 24 41.3	102 30 41	322±	15	9′ = 9′	....	Σ.1115	757
3974	7 25 49.6	144 56 41	240.3	3	8′ 11	A neat double star..........	B.1641	521
	52.1	56 55	243.5	3	8 11	Very neat. Pos 242.7, 244.3	......	552
3975	7 26 ±	171 18 —	330.3	8	9 10	R A estimated, being too late for transit	......	666
3976	7 26 31.0	158 33 21	{ 129.5 { 327.1	6 5	9 11 9 13	} Triple	......	546
	33.5	33 22	132.5	8	9 11	....	......	538
3977	7 26 31.7	151 15 41	69.7	12	8 9	....	......	524
3978	7 26 34.7	117 49 1	92±	10	9 11	....	......	771
3979	7 27 31.1	126 4 1	71.5	8	10 = 10	A star 6 m n f..........	......	661
	31.7	3 52	69.3	6	10 = 10	....	......	659
	32.0	4 8	59.9	10	11 = 11	The pos probably read 10° wrong	......	540
3980	7 27 52.8:	147 12 32	126±	10	8 13	Ill defined. The first of 3 st in a line..........	......	679
3981	7 28 6.5	138 51 9	326.7	18	8′ 9	Triple. A 3d star n f..........	......	526
3982	7 28 32.9	118 0 9	......	..	6 9 9	Coarsely triple R A 7 33 32.9, *Nisi* 28^m. Lacailles R A agrees with the latter alternative.	L.2867	771
——	7 28 49.6	104 6 50	132.1	12	8 = 8	A fine D ✱, chief, or almost so, of a splendid cluster. P D by obs 103°, but the cluster is VIII. 38, and 104 is the true degree.	Σ.1121	757
3983	7 29 14.8	103 29 1	305.8	5	10′ 11	Chief of a large fine cluster of small stars	......	676
3984	7 29 16.1	144 48 8	{ 317.3 { 255.9	15 60	7 14 7 8	} Triple	......	552
3985	7 29 29.3	157 47 40	86.3	1½	9 9+	....	......	545
	....	....	83.5	1½	9 9	Transit missed. Viewed and measured after passing merid.	......	546
	35.9	47 40	85.5	1½	10 10+	Pos 85.3, 85.6; with 320 and whole aperture, with which it is finely separated.	......	538
3986	7 29 34.6	140 28 50	219.8	50	8 9	....	......	680
3987	7 30 57.3	168 49 17	244.6	40	7 12	....	L.2948	669
3988	7 31 20.4	138 28 30	295.9	12	9′ 11	Large ✱ red. N.B. The right Ascensions in this ʃ are liable to uncertainty of several seconds.	B.1673	680
	27.5	28 22	300.3	15	9 11	This R A to be preferred	......	526
3989	7 31 25.7	150 55 27	225.8	18	10 11	....	......	682
	27.1	54 46	225.3	18	9 10	....	......	681
3990	7 33 30.3	137 20 1	345.3	30	8 9	....	......	544
3991	7 33 32.9	164 40 23	206.7	15	9′ 10	....	......	683
3992	7 33 58.1	133 35 31	122.4	15	9′ 9′	....	......	528
3993	7 34 9.3	150 2 46	16.1	20	9 9	Nisi R A = 35^m $11^s.6$, there being left a doubt as to the wire observed.	......	524
3994	7 34 33.0	138 39 45	{ 12.1 { 206.8	12 25	8 11 8 13	} Triple	B.1702	526
3995	7 36 10.8	111 42 41	249.7	5	10 11	....	......	768
——	7 37 38.1	104 17 38	350±	25	7 8	Position estimated from diagram	σ. 278	676
3996	7 38 23.0	174 9 —	244.8	12	6′ 12	R A from Mr. Maclear's determination. P D. Rough	B.1734	666
	26.4	7 16	248.6	15	6 13	Pos 249.3, 248.0; Place as observed..........	......	667

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
3997	7 38 43.7	163 53 23	98.0	1½	8 = 8	Fine star. Pos 99.4, 96.7......	B.1731	683
	44.2	53 14	100.4	¾	8′ = 8′	Pos 102.7, 99.3, 99.3; very beautiful double ✻. Quite as close as η Coronæ.	......	547
	46.5	53 30	101.3::	1	7 = 7	In the best moments when the star collects itself, certainly seen double, but no measure can be got. The south-easter rising rapidly, and stars dilated with momentary intervals of concentration. After sweeping on 20^m I returned to this star and got a measure as here set down in an interval of steady good definition, but being so far out of merid. the angle is of course open to much error.	......	672
3998	7 39 7.3	142 6 6	181.3	10	9′ 10	Both yellow	......	763
3999	7 39 13±	144 0 36	......	3	10 11	R A very rough, taken past merid.	......	763
4000	7 39 13.8	148 15 57	......	..	......	The night too bad, with any management, to get even a glimpse of the small star.	B.1737	679
	14.1	16 0	230.3	1¾	6′ 11	Beautiful double star. Pos 232.7, 227.9, with power 320, and 12 inches aperture.	......	664
	18.0	16 4	230.3	1	6 11	Beautiful double star, but extremely difficult, being of the order Pervicinæ. Pos 234.3, 226.3, measured with power 320 and 12 inches aperture.	......	764
4001	7 39 29.1	157 3 59	303.7	4	9′ 12	The last of 3 stars in an obtuse angled nearly isosceles triangle.	......	538
——	7 39 33.8	140 3 30	134.3	60	7′ 8	R Ascension not good in this *f*; Δ. 55 = B. 1740 + 1741.	L.2976	680
4002	7 40 29.3	139 52 33	87.3	18	8′ 13	......	......	526
4003	7 40 41.9	113 46 18	127.8	15	9′ 10	......	......	768
4004	7 41 39.2	152 59 46	337.3	12	8′ 12	......	......	524
4005	7 42 1.6	146 18 24	215.3	30	6 12	......	B.1762	552
4006	7 42 2.4	134 50 14	299.3	12	9 12	......	......	542
	2.8	50 26	300.3	8	9 11′	This obs makes the minute 43^m; one or other is of course mistaken. In such cases the earlier is preferred to ensure being in time in future observations.	......	528
4007	7 42 50.3	117 49 33	272.8	15	9′ = 9′	......	......	531
4008	7 43 11.0	142 54 46	228.8	20	8′ 14	......	L.3019	525
4009	7 43 47.0	121 44 22	129.7	10	9 = 9	Both stars pale yellow	......	535
——	7 43 53.7	162 11 52	117.7	18	5 9′	ζ *Piscis Volantis*, L yell, S pale blue. Pos 117.6, 117.8.	B.1779	523
	54.2	11 43	114.3	15	5 12	Δ R A = 3^s.5. Pos 115.4, 113.3	Δ. 57	683
	54.8	11 54	115.7	25	5 10	Pos 115.2, 118.1, 113.7. Superb star......	......	673
	....	....	115.0	18	5 11	Pos 114.8, 115.3, 114.9. Fine D star......	......	672
4010	7 45 5.0	177 1 33	235.3	10	9′ 13	Ill defined	......	674
4011	7 46 15.9	156 38 50	300.2	20	9 9′	......	......	538
4012	7 46 23.9	149 51 46	105.5	12	5′ 13	Very delicate. *Requires* illumin	B. 1800	524
	....	52 40	100.7	15	6 14	Very delicate. Measured when past meridian......	......	764
4013	7 46 28.7	107 53 18	199.7	12	7′ 13	Points to a third	......	677
4014	7 46 42.8	153 15 24	153.6	15	8′ 9	......	......	773
4015	7 46 46.7	107 21 50	221.8	20	9 = 9	......	......	675
4016	7 47 15.4	140 57 46	168.3	15	9′ 9′	......	......	763
4017	7 49 1.2	140 28 15	206.5	10	8 11	Has a third star n f	......	680
4018	7 49 13.9	149 10 41	325.2	6	8 9	......	......	764
4019	7 49 33.5	131 24 2	155.6	4	8 11	Ill defined	......	772
4020	7 50 37.9	165 18 17	320.2	15	8′ 11	Very ill defined	......	548
4021	7 50 57.1	148 6 57	236.1	12	8 13	......	......	664
4022	7 51 5.6	111 1 26	7.5	15	9 10	......	......	677
4023	7 51 35.6	160 20 23	227.7	1	9′ 10	Beautifully divided	......	546
	37.6	20 30	226.8	1	9′ 10	Very delicate	......	745

3 D

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4024	7 53 13.1	119 3 3	82.5	12	9 10	......	......	771
	14.5	2 57	82.7	12	9 10	......	......	531
4025	7 53 17.5	138 47 9	{ 47.6 { 34.8	18 40	6 14 6 12	} Difficult and very delicate	B. 1839	680
4026	7 53 38.6	134 27 16	279.8	3	12=12	......	......	542
4027	7 53 57.1	150 21 26	110.9	12	10=10	......	......	681
	57.5	21 23	......	..	......	Double. No description	......	682
4028	7 54 25.1	139 30 56	43.2	20	8′= 8′	Fine D star. Pos 42.7, 43.8	B. 1848	526
4029	7 54 46.2	153 37 38	91.3	10	10 11	......	......	550
4030	7 54 54.5	130 50 34	344.9	40	7 9	Large star white, S rich ruby coloured approaching to sanguine. Very remarkable.	......	772
——	7 55 25.0	102 43 41	148.2	3	10=10	Very neat star. Pos 148.8, 147.7......	Σ. 1178	676
	27.6	43 49	147.7	4	9′= 9′	Pos 146.3, 149.3, 147.5. This obs makes the R A 59^s.6, but this is owing to an obvious mistake of the wire, which is rectified in the reduction.		
4031	7 55 29.6	150 24 46	352.6	2½	9 10	In a cluster	......	524
	31.4	24 30	355.5	6	8 9	Chief double star of a fine cluster......	......	664
	32.6	23 39	357.1	5	7′ 9	One of the large stars in a fine cl	......	764
	33.0	23 16	352.5	8	9 10	......	......	681
	35.5	24 2	354.5	..	......	Pos 355.3, 353.7......	......	682
4032	7 55 —	136 50 —	351.5	30.8	7 9′	Mean epoch, 1836.555	......	E
4033	7 55 41.0	137 20 48	64.3	12	8′ 9	......	......	553
4034	7 56 19.3	132 17 41	290.7	4	8′ 11	......	......	542
	20.4	18 25	293.0	4	9 10	Neat star	......	528
	22.2	17 48	293.4	4	9 11	......	......	686
4035	7 56 26.7	121 59 7	131.7	30	7′ 9	L yellow, S decided purplish red	B. 1866	535
4036	7 56 32.2	147 29 5	78.6	3	10′=10′	......	......	543
4037	7 56 35.3	117 4 1	337.7	12	8′ 11	80 or 100 stars in the field......	......	531
4038	7 57 —	130 50 —	345.4	29.1	7 8′	Mean epoch, 1837.045	B. 1872	E
4039	7 57 1.9	127 43 6	51.7	8	10=10	......	......	540
4040	7 57 4.0	125 56 40	138.3	18	8′ 9	......	......	661
4041	7 57 42.0	111 57 17	179.3	3	7 15	A most delicate and difficult object. The night is not such as to give *perfect* definition, although pretty good; so that, although *I have no doubt*, I should like to see the star again under more favourable circumstances.	......	768
4042	7 58 —	144 11 —	......	..	......	Class 4 or 5. Review of B	......	E
4043	7 58 22.8	136 5 1	207.1	20	8 9	Red and blue	......	553
	24.6	5 28	207.3	25	8′ 9	L pale rose; S greenish blue; very peculiar, and richly contrasted colours.	......	527
4044	7 58 26.6	144 33 46	......	..	......	By diagram triple, the small ✱ being double	......	551
4045	7 58 44.3	139 57 53	219.8	2½	9 11	......	......	526
4046	7 59 12.5	123 5 8	84.6	20	7′ 10	......	B. 1887	786
4047	8 0 25.0	178 42 53	{ 147.7 { 317.3	.. ..	8 13 8 13	A B } A C } Triple. R A open to very great errors	......	674
4048	8 2 50.6	131 41 56	208.5	10	10 10	......	......	712
	53.1	41 35	207.8	8	9′ 10	......	......	528
	53.9	41 50	207.1	9	9=9	The chief of about 60 stars in field	......	529

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4049	8 3 41.4	127 51 19	316.3	4	10 11	....	......	661
——	8 4 1.4	132 7 3	87.3	7	8 9	Neat star. Marked as double in the Brisbane Catalogue.	B. 1914 Δ. 63	691
	2.0	8 19	86.6	5	7 8′	....	......	685
	....	....	85.0	4	7′ 8	Pos 83.8, 86.3..................................	......	686
——	8 4 16.2	136 50 29	220.0	30	3′ 5	Also three more. γ *Argus*	B. 1916	553
	17.2	49 28	217.2	50	2′ 5	Pos 218.7, 216.1, 216.7. Besides the two principal stars, are three others, 11, 11, and 13 m, arranged in an exact right line.	1917 Δ. 65	527
4050	8 4 17.0	105 9 4	303.3	..	9 9	Dist set down as 2″, but it is probably a mistake of writing for 20″, as the diagram makes the stars distant.	......	675
4051	8 4 45.0	126 47 27	263.4	15	6 14	[Place from the Brisbane Catalogue.]	B. 1922	661
4052	8 4 46.0	125 19 8	120±	12	9 10	Too ill defined for measure. Pos estimated from diagram.	......	786
4053	8 5 19.1	150 35 26	{ 92.3 { 310.3	12 20	8 10 8 13	} Triple..	L. 3211	681
4054	8 5 21.3	151 51 45	{ 285.7 { 319.7	15 25	8 11 8 12	} Triple..	......	682
4055	8 5 29.3	159 22 15	6.6	6	9 = 9	Both stars ruddy yellow, a marked shade of colour, and both exactly of the same tint.	......	546
	34.6	22 40	6.0	6	9 = 9	Both yellow. Measure interrupted by clouds......	......	545
4056	8 5 39.9	157 0 59	359.8	6	10 = 10	....	......	556
	45.3	1 46	355.0	8	10 10	....	......	538
4057	8 6 46.7	132 29 5	292.1	30	6 11	....	A. 1006	542
4058	8 7 4.9	125 23 19	190±	4	6 7	Pos estim from diag made with 320, very ill defined.	B. 1938	809
——	8 7 20.8	158 7 40	17.5	4	5′ 9	ε *Volantis*. Superb D star, but ill defined. Pos 18.7, 16.3. Is No. 7 of M. Rumker's list.	B. 1940 Δ. 66	538
4059	8 7 26.4	121 37 48	339±	30	6 14	....	B. 1939	678
4060	8 7 —	125 56 —	177.0	21.6	9 10	Epoch 1836.988..................................	......	E
4061	8 7 28.9	156 40 17	14.9	4	10 11	....	......	557
4062	8 8 1.3	129 49 57	343.4	50	5′ 10	L yellow S blue. [*This obs makes the P D* 128°, *but Lacaille and Taylor agree in making it* 129. *The star being a large one, a mistake on my part is presumed.*]	M. 3501	772
4063	8 8 20±	126 50 30±	346.3	20	8 9′	L white, S so very red as to give the large star by contrast a bluish tint.	L. 3234	659
4064	8 8 29.9	158 53 29	278.7	12	10 12	....	......	673
4065	8 8 39.2	143 32 6	224.4	12	10 = 10	A bright ∗ (B. 1896) 6′ dist, s p................	......	763
4066	8 8 41.2	133 0 54	136.5	2	10 11	Pos 135.1, 137.9................................	......	542
4067	8 8 46.8	173 14 17	{ 65.1 { 88.0	25 30	7 12 7 12	} Triple. A fourth near........................	L. 3371?	666
	53.8	14 12	{ 67.0 { 89±	.. ..	....	Triple, very ill defined. N.B. This obs makes the R A 18m instead of 8m. The two observations, however, evidently relate to the same star, and the earlier time is of course preferred.	......	667
4068	8 8 47.5	166 58 4	300.3	8	10 11	....	......	548
4069	8 9 —	135 19 —	256.7	33.2	6′ 9	Mean epoch, 1836.490	B. 1948	E
4070	8 9 0.3	104 38 15	103.5	30	7′ 12	....	......	687
4071	8 9 6.6	153 59 52	204.7	5	10 10	....	......	550
	9 8.7	60 2	201.9	10	9′ 10	....	......	773
——	8 10 32.1	72 27 49	4.3	4	10 12	....	Σ. 1214	688
4072	8 10 57.4	109 25 49	178.1	8	8′ 13	2 or 3 companions besides......................	......	677
4073	8 11 ..	126 47 ..	170±	1	8 8	Though I have not a doubt that this is really a double star, yet the stars generally are so strangely defined to-night, and put on such unaccountable appearances, that it must be re-examined.	L. 3258	659
4074	8 12 23.5	139 43 39	267.3	8	10 12	....	......	680

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4075	8 13 2.4	155 45 19	264.9	2	10 10	......	......	550
	3.1	45 16	267.0	2	10 10	......	......	773
4076	8 13 10.8	157 17 55	112.3	2	12 13	Delicate	......	557
——	8 13 15.0:	134 31 6	225.1	4	8′ 8′	Marked as double in B	B. 1973	685
	18.2	30 14	227.6	3	9′ = 9′	......	......	542
4077	8 13 16.1	152 20 30	298.3	15	9 10	......	......	682
4078	8 13 20.4	113 33 31	132.9	12	8′ 11	......	......	559
4079	8 13 39.0	145 21 48	173.5	20	7 14	[*Lacaille's P D would be* 145 15.]	L. 3278?	552
4080	8 13 55.8	136 36 10	218.3	4	9 9+	......	......	553
4081	8 14 —	137 40 —	......	..	......	Class 4. Rev of B	B. 1977	E
4082	8 14 5.9	139 44 48	86.3	3	10 = 10	......	......	680
	7.4	44 35	86.8	2	10 = 10	......	......	526
4083	8 14 25.2	125 41 8	110.7	25	10 12	Surrounded with evident nebula, which seems to belong to both stars. Extremely ill defined.	......	786
	27.1	40 51	113.8	25	9′ 12	Not quite positive that the nebula involves both stars. N.B. In a field with 70 stars.	......	541
	27.3	41 5	......	..	......	A neb attached to and involving a star. (Definition bad.)	......	809
	27.9	40 50	110.7	30	9 11	Involved in pretty bright nebula 50″ in diameter....	......	540
4084	8 14 26.0	148 37 58	158.7 266.1	60 4	6′ 9 10 10	A and (B + C) regarded as one star B and C. The small star double.	B. 1978	664
4085	8 14 57.1	125 56 17	270.0	5	5′ 14	Very delicate	B. 1983	661
	....	57 15	265±	3	5′ 15	Extremely difficult, because the ✻ will not bear the full aperture, being ill defined.	......	809
4086	8 15 42.2	175 27 4	76.7	80	8′ 10	Δ R A = 45ˢ.5	B. 2007	674
4087	8 16 6.9	130 27 2	321.0 340.9 310±	1 15 30	8′ = 8′ 8 14 8 15	A and B. (A + B) and C. (A + B) and D. Quadruple. The large star strongly suspected to be close double with power 180, but could not bring it up to a disc, the definition being bad to-night; 320 and 9 inches aperture, however, divided it cleanly. The measure inaccurate, the star being considerably past meridian when taken.	......	772
4088	8 16 49.4	118 25 34	290±	25	6 11	......	L. 3298	771
4089	8 16 59.7	134 18 18	269.8	10	10 11	A star 7 m near	......	686
4090	8 17 31.6	132 13 58	14.1	15	8 9′	......	......	691
4091	8 19 8.8	133 43 43	294.9	15	9 12	......	......	691
4092	8 19 46.9	129 1 46	204.7	10	10 11	......	......	661
4093	8 20 5.1	128 29 53	122.1	15	8′ = 8′	......	L. 3324	540
4094	8 20 9.6	124 58 48	211.3	20	9′ 10	......	......	786
——	8 20 15.6	160 58 41	52.7	60	6 6	B. 2018 + 2022; a third 8 m	L. 3355	546
4095	8 20 36.0	162 57 53	236.3 336.5	8 15	10 13 10 10′	......	......	683
4096	8 21 13.9	150 27 10	91.3	10	9′ 10	The first of two	......	682
4097	8 21 15.4	150 26 20	356.1	10	9′ 11	The following of two	......	682
4098	8 21 52.5	129 32 30	274.9	15	8′ 11	The preceding of two	......	555
4099	8 21 55.0	129 29 30	211.9	20	8′ 12	The following of two	......	555
4100	8 22 23.2	107 46 56	179.3	20	9′ 11	......	......	677
4101	8 22 28.7	139 46 11	228.8	4	9′ = 9′	......	......	526
4102	8 23 —	132 1 —	......	..	......	Class 5 or 6. Review of B	B. 2046	E
4103	8 23 32.5	162 51 6	287.4 158.4	30 45	5 13 5 14	Pos 288.7, 286.3, 288.3; Δ R A = 7ˢ.0 ...... (η Volantis)	B. 2055	683

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4104	8 23 41.2	137 21 53	235.5 39.7	2 15	6 10 6 9	Beautifully triple. Measures incomplete hy reason of a sudden gust of the S.E. wind, which confounded all into an indistinguishable hlot. The star is called A Argus in some catalogues.	B. 2056	527
	42.7	21 40	239.7 34.8	2½ 20	5′ 9 5′ 11	Delicately triple; L white (A) small * C pale blue	......	553
——	8 23 41.9	134 9 18	346.6	3	6 9	Pos 344.5, 348.8	B. 2054	691
	43.0	10 11	349.0	4	6′ 8′	Fine D star. Pos 346.5, 351.8, 348.8	Δ. 70	685
4105	8 23 52.5	168 40 48	69.5	8	10′=10′		......	670
4106	8 24 56.3	126 8 10	138.8	18	8 10	[Lacaille's R A differs 1^m]	L.3364?	540
4107	8 25 9.5	128 30 10	325.4 98.7	3 30	7 10 7 9	A B A C A white, C plum coloured	L. 3375	661
4108	8 26 12.2	150 32 6	232.6	20	9 10		......	778
	15.0	32 52	229.6	18	9′ 10		......	682
4109	8 26 31.5	165 52 18	124.0	30	8 8′		L. 3437	671
4110	8 28 1.8	156 33 34	221.4	25	7 11		B. 2088	556
4111	8 28 35.3	139 21 41	110.2	..	......	By diagram a fine D star, class III	......	680
4112	8 29 25.4	138 14 42	30.2	8	9 = 9		......	526
4113	8 30 5.5	128 10 34	201.9	12	10 10		......	661
4114	8 30 14.5	130 24 12	230.0	2	11 11		......	772
4115	8 30 46.2	123 8 53	155.6:: 21.3	20 40	6′ 12 6′ 13	A B A C Triple	L. 3434	786
	47.6	9 16	159.3	20	6′ 12	A third also	......	787
4116	8 31 10.2	136 54 51	0.2	6	8 9	A fine douhle star	......	553
4117	8 31 10.7	150 54 29	194.3	8	8 13	Several others seen. A group	......	682
4118	8 31 40.5	162 53 58	20.1	20	9 11		......	683
4119	8 31 53.8	138 50 10	221.8	10	9 12		B. 2115	526
	....	50 40	231.7	10	8 11	One or other position seems to be 10° wrong in the reading.	......	680
4120	8 32 37.6	118 57 37	40	50	5′ 11	Pos from diagram	B. 2122	771
	42.3	18	40±	35	6′ 11	Pos estim from diagram	......	564
4121	8 33 6.9	153 1 44	85.1	2	11 11		......	550
4122	8 33 20.5	135 37 39	156.6	12	9′= 9′	Chief of a cluster of 12 or 13 L st	......	527
4123	8 33 49.7	142 59 59	0.0	25	9 12	Exactly in the parallel	......	440
4124	8 33 51.6	105 20 27	122.8	35	5 14		A. 1063	675
4125	8 34 19.3	152 15 48	230.3	8	7 11	Pos 229.1, 231.0, 230.8	B. 2135	432
	20.4	15 47	225.9	8	5′ 14	Very delicate, ill defined. Pos 228.0, 223.8. (This last measure prohahly wrong. The bad definition hardly explains the extraordinary disagreement in the magnitudes.)	......	682
4126	8 34 54.2	142 28 59	28±	15	7′ 11		B. 2143	440
4127	8 34 59.3	136 2 30	57.7	30	5 11	(h. *Velorum.*)	B. 2141	553
4128	8 35 36.1	149 42 59	220.2	1¾	7′ 8	Pos 219.7, 220.7	B. 2153	764
4129	8 36 16.7	125 54 12	346.1	6	9 13		......	661
4130	8 36 30.8	146 56 30	216.4	3	7′ 10		B. 2159	551
4131	8 36 45.9	73 34 50	144.2	20	10=10		......	688
4132	8 36 48.3	172 42 38	321.3	5	11=11	The northern of an elongated group of 10 considerâhle stars, with smaller intermixed.	......	667
——	8 37 34.6	142 30 21	309.3	80	6 6′	Both stars single and well defined	B. 2168 +2169	763
4133	8 38 18.7	132 2 43	60.3	45	5 13	d *Velorum*	B. 2179	691
	20.1	1 24	62.1	35	6 12		......	685
	20.6	2 26	61.9	40	5′ 11	Large star yellow, small hlue	......	529
4134	8 38 24.7	159 46 57	105.8	35	5′ 9	θ *Volantis*	B. 2184	546
4135	8 38 30.8	71 58 57	49.8	30	7 15		......	688

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4136	8 39 59.1	144 6 10	64.0	80	2′ 10	δ *Argus*. Δ R A = 7s.0	A. 1077	552
	60.9	5 39	60.0	80	3 12	....	......	440
4137	8 40 2.3	164 18 28	192.4	5	9′ 12	....	......	683
4138	8 40 28.1	128 53 52	321.3	8	8 13	....	......	661
4139	8 40 34.4	149 19 57	45.3	12	10′ 11	....	......	432
4140	8 41 2.5	102 47 17	280.1	6	9′ 10	....	......	687
——	8 41 3.9	148 6 13	289.7 357.3 217.6	4 60 80	7 7′ 7 12 7 12	*Noted as double in Brisb.* Pos 290.8, 288.6	B. 2206	764
	9.6	6 27	286.6	3	8 = 8	Pos 286.9, 286.3. A fine double star. It has two companions 12 m, near. This R A to be preferred to that of ∫ 764; those of that ∫ being precarious.	R. 9	543
4141	8 41 45.6	118 10 32	329±	8	9′ 10	....	......	531
4142	8 42 38±	146 59 35	219.4	3	8 10	Very fine D star. R A roughly taken..........	......	684
4143	8 43 15.8	112 35 15	131.8	1½	8′ 10	Very elegant star	......	555
4144	8 43 41.1	125 16 51	309±	2	7 13	Excessively difficult, but remained satisfied of its being double.	......	787
	42.5	18 7	319.8	1½	7 12	Very difficult, definition being too bad for using power. Measure a mere rude approximation. Perfectly certain of its being double; the small ✱ in good moments being separated.	......	809
4145	8 44 52.1	143 23 16	257.1	4	9′ 11	....	......	763
4146	8 45 26.2	102 35 51	99.2	35	6 14	Bears some illumination..........	......	687
4147	8 45 57.4	151 38 0	353.2	3	11′ 12	....	......	682
4148	8 46 —	143 29 26 :	106.1	4	8 12	....	......	763
4149	8 46 19.5	127 33 30	202.1	12	9 12	Unless R A = 8 46 58.7	......	540
——	8 47 25.6	107 36 16	143.7	100	6 7	....	S. 585	675
	26.8	34 54	144.4	50	7 8	Excessively ill defined. (In which case magnitudes and distances are always difficult to estimate.)	......	561
4150	8 47 42.0	131 11 21	267.3	15	8 11	....	......	554
	44.4	10 44	262.7	20	8 12	....	......	529
4151	8 48 44.2	142 52 9	255±	3	10 13	....	......	440
4152	8 48 44.9	153 2 17	338.6	6	9 11	Pos 337.7, 339.6..........	......	550
4153	8 49 31.1	134 23 48	121.6	30	6 14	Obs gives R A 50m 4.7, but it is evident from the zeros that the wire was mistaken, which rectified gives as here set down.	B. 2272	691
4154	8 49 46.7	121 26 6	243.8	12	9′ 9′	....	......	678
4155	8 50 17.8	150 47 35	197.8	4	11 = 11	A and B. Triple. An exact equilateral triangle, the other ✱ 13 m precedes.	......	432
4156	8 51 12.0	149 59 58	322.3	25	5 14	Difficult. (c *Carinæ*.)	B. 2281	543
——	8 51 28.2	144 52 36	351.4	70	7′ 8	Large star very red. A third very small, and closer suspected. [If this be Δ 73, his P D is 14′ wrong. B. 2286 is marked as double in B.]	B. 2286	551
——	8 51 39.5	74 3 49	31.1	4	9 = 9	Pos 30.5, 31.7; 39.2 rejected, probably misread 10 degrees.	Σ. 1300	688
4157	8 51 51.3	124 56 58	279.7	15	8′ 12	....	......	787
	68.4	56 41	280.6	15	8 12	[In one or other of these observations, a mistake of 20 seconds in R A must have been committed.]	......	809
4158	8 52 1.6	174 3 58	60.0	18	9′ 12	Pos 59.3, 61.4, 59.3	......	667
4159	8 52 13.0	142 56 19	190±	12	9 13	Large star red..........	......	440
4160	8 52 19.6	101 59 17	280.9	4	12 13	....	......	687
——	8 52 45.7	148 34 30	71.7	..	6 7	b′ *Carinæ*. [Called 4 m by Lacaille.]	Δ. 74	684
	47.2	34 33	71.7	..	6 7	L. 3639 = B. 2293 + 2294	......	764
4161	8 53 5.3	136 34 29	329.3	20	6′ 13	....	B. 2296	527
4162	8 53 26.9	111 20 25	219.0	3	9′ = 9′	....	......	558

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4163	8 53 49.0	166 38 52	320.7	15	9 12	......	......	671
4164	8 54 42.6	155 32 23	144.1	12	8 10	L yellow, S pale blue......	L. 3666	550
	44.9	30 39	142.6	15	8 12	......	......	773
	47.0	33 3	144.1	15	8 10	Very neat star......	......	538
——	8 54 50.8	75 1 52	126.4	30	9′ 10	......	h. 115	688
4165	8 56 —	141 31 —	87.9	1.4	6 8	Mean epoch, 1837,265	B. 2320	E
——	8 56 8.0	115 38 25	273.7	8	10=10	The micr reading gives 73.7, but it is obvious from the diagram that the fig. 2 has been omitted in writing down the measure. See also h. 2482.	h. 2482	563
4166	8 56 25.3	122 56 38	150.3	18	8 = 8	Fine; pos 150.8; 149.9......	L. 3660	678
4167	8 56 39.3	155 41 17	22.2	3	8 15	Exceedingly delicate. Pos 22.8, 21.7. [N.B. The minute of R A given by this obs is 57, but as this disagrees with the result of ʃ 773, which is 56, the earlier is preferred.	......	550
	40.7	41 33	23.3	2	9 14	Very delicate	......	773
4168	8 56 59.4	120 39 30	67.8	3	12=12	......	......	531
4169	8 57 8.4	127 31 34	282.6	65	9 12	......	......	540
——	8 57 32.9	73 46 46	309.3	7	10 11	......	h. 118	688
4170	8 58 30.3	149 15 18	254.6	4	11=11	......	......	432
4171	8 58 35.4	159 3 11	235.6	20	10 10	......	......	673
4172	8 58 53.6	114 43 15	213.6	6	8′ 9	Neat star......	......	563
4173	8 59 23.3	121 32 7	......	5	11,11,11	An equilateral triangle of equal stars	......	678
4174	8 59 23.8	105 2 20	258.7	5	11=11	......	......	687
4175	8 59 33.0	151 41 1	128.1	15	8 11	Pos 129.6, 126.7......	B. 2332	682
	33.0	40 41	130.6	20	7 11	Very ill defined	......	778
4176	8 59 39.2	131 26 10	293.3	15	9′ 9′	......	......	810
4177	8 59 46.3	145 40 11	{ 278.8 { 295±	15 10	8 9 9 10	A B } B C } L white; S red	L. 3689	551
——	8 59 47.0	74 4 35	59.0	6	9 10′	Pos 59.3, 58.6. Fine D *	Σ. 1317	688
4178	9 0 16.3	147 10 28	164.8	3	6 14	Power 320, pos 166.3, 163.3; extremely difficult, and not well defined.	B. 2337	764
	16.7	10 17	164.2	4	6 13	Pos 165.3, 164.3, 163.1. Measured with 180, and 12 inches aperture. Very difficult, by reason of the extreme smallness of the companion, which with 9 in. is barely discernible.	......	664
	....	....	156±	2½	......	Measure difficult, and spoiled by the presence of another person in the gallery.	......	684
4179	9 0 36.3	124 3 25	290.3	12	10 10	......	......	787
4180	9 1 10±	133 16 23	125±	25	8′ 10	......	......	691
4181	9 1 13.6	144 3 9	150±	1½	11=11	......	......	440
4182	9 2 18.1	106 9 55	83±	25	8 12	......	......	675
4183	9 2 45.3	119 40 26	144.9	18	6′ 9′	(*ε Mali.*) Pos 144.8; 142.1; 147.8	A. 1115	678
	46.2	41 3	140.5	15	7 12	......	......	564
——	9 3 12.1	72 46 48	52.8	1	9 = 9	Too late, and the measure therefore open to much error.	Σ. 1322	688
4184	9 3 41.9	165 37 34	218.7	15	8 13	......	......	782
4185	9 4 36.9	153 21 50	242.7	15	9′ 9′	......	......	773
4186	9 4 47.1	134 37 10	274.3	8	10′ 10′	......	......	542
4187	9 5 —	134 0 —	......	..	3′ 10	Class 4. Review	......	E
4188	9 6 —	132 55 —	286.9	2.9	6′ 7′	Mean epoch, 1835.708	B. 2387	E
4189	9 6 50.9	143 15 24	105±	15	9 12	......	......	440
4190	9 6 55.0	147 16 13	19.5	7	7 12	An elegant double star	B. 2391	764
4191	9 8 2.7	132 31 29	6.8	4	6′ 13	A most beautiful and delicate object. The small star best seen with an illuminated field.	B. 2400	542
	5.0	31 25	9.9	4	6 14	Pos 11.1, 8.7. Very delicate and difficult	......	685

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4192	9 8 30.5	139 38 14	6.0	30	9′ 9′	....	......	566
4193	9 8 40.8	112 27 5	126.4	2	8 12	Difficult and ill defined	......	532
4194	9 10 0.9	172 59 57	44.3	8	11=11	....	......	667
	4.1	60 25	48.8	12	10 10	....	......	779
4195	9 10 ..	154 11 ..	58.7	18	9 9′	About 10′ preceding and nearly in the same parallel with a superb globular cluster.	......	550
	....	10 ..	......	..	......	A neat double star following a ⊕	......	433
4196	9 11 5.3	141 12 56	126.5	3	10 11	Both yellow	......	762
4197	9 12 4.0	142 6 9	195±	15	9 11	....	......	440
4198	9 12 29.0	129 49 50	182.3	10	10 10	A 3rd star 11 m, exactly in the same line, continued backwards, pos 2°.3.	......	810
4199	9 12 33.1	117 4 3	108±	12	9 10	....	......	564
	35.5	3 36	110.5	15	8 8′	Neat star, pos 110.0, 110.9	......	771
4200	9 13 32.1	121 2 37	71.5	2	8 9	Fine double star	......	678
4201	9 14 5.3	118 16 25	100±	2	11′=11′	Pos estim from diagram; a 3rd * near south of both	......	771
4202	9 15 6.5	135 16 56	152.7	15	8 13	....	L. 3801	774
4203	9 15 18.7	122 1 46	54.3	12	10=10	....	......	678
——	9 15 47.3	159 5 55	9.4	10	9′ 10	R. 10, marked as double in B.	B. 2452	429
4204	9 16 19.6	170 28 1	352.4	3	11 13	The preceding of two D S in field	......	549
	....	28 20	356.6	5	12 13	R A missed, being past merid	......	780
4205	9 17 7.6	170 25 48	248.2	3	10 13	The following of two in field	......	549
	....	26 44	244.3	4	10 13	R A missed being past merid	......	780
4206	9 17 38.4	164 10 44	{338.5 347.7	5 40	6 13 6 11	A B. pos 337.8, 339.3 } Delicate and beautiful .... A C	B. 2470	547
4207	9 18 18.2	144 10 26	308.5	..	......	By diagram III. class	......	762
4208	9 18 43.4	126 32 29	127.5	16	9 10′	....	......	809
4209	9 19 16.8	137 33 10	{336.3 1.9	25 12	8′ 9 8′ 12	A B } Triple A C	......	775
	17.3	32 33	{336.5 3.5	25 12	9 10 9 13	A B } A C	......	776
4210	9 20 —	156 45 37	236.2	4	9 10	Pos 233.8, 238.6. Both orange	......	537
4211	9 20 —	174 58 —	113.2	1.7	6 10	Epoch 1835.082. ζ Octantis. Considerable doubt of its being really a double star.	B. 2941	E
4212	9 21 9.6	131 51 0	67.3	15	7 14	[N.B. One of these 2 right ascensions is affected by a mistake of the moveable for the fixed wire. On examination of all the circumstance, it appears certain that this is the erroneous one.]	......	772
	26.9	49 26	65.8	20	7′ 13	....	......	744
4213	9 21 13.4	151 13 10	318.3	7	7′ 10	Pos 317.3, 317.4, 320.3; beautiful	B. 2498	432
	13.7	13 21	324.6	10	6 12	Pos 325.0, 324.3. Fine star	L. 3866	777
	14.1	13 16	326.6	6	6′ 12	Small * red. Observed with Mr. Maclear	......	778
	....	13 40	319.0	8	8 10	Pos 320.0, 318.0	......	433
4214	9 21 31.2	166 53 54	193.3	10	10 10′	Pos 193.9, 192.8	......	782
4215	9 22 31.5	138 44 52	260.1	6	11 11′	R A ::	......	680
4216	9 23 24.6	159 13 35	335.5	10	10 10′	R A ::	......	429
——	9 23 28.4	121 10 13	209.9	8	7′ 8	ζ Antliæ; pos 209.7, 210.1, marked as double in B. ? if Δ 78, as his position is 88° 53′.	B. 2515 Δ. 78 ?	678
4217	9 25 38.2	167 10 4	278.9	20	7 13	....	L. 3941	782
4218	9 26 5.4	125 37 54	28.9	3	8′ 12	Neat double star	......	787
	8.3	39 25	25.9	4	8 12	....	......	541
——	9 26 34.7	74 52 11	82.8	45	7 9	7 *Leonis*	σ. 350	688
4219	9 26 35.7	132 1 51	320.8	20	8 10	Points almost exactly to a third	......	774
——	9 27 —	72 59 —	......	..	......	Evidently not a single star, but the definition to-night is not good enough to divide and measure it.	Σ. 1372	688

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4220	9 27 39.4	138 15 26	200.1	1½	7 = 7	Pos 20.7, 19.6; crawling and tremulous	B. 2546	776
	39.9	15 25	196.1	1½	6′ 7	Pos 195.7, 196.6. Elongated with 180, divided and measured with 320 in intervals of S.E. gusts.	......	553
	42.6	15 4	197.0	1½	6′ 7	Pos with 320, 198.3, 197.3, 195.5. A superb double star.	......	680
4221	9 27 57.6	142 41 26	133.5	4	9′ 13	The chief of a p L rich cluster	......	763
4222	9 28 6.2	160 22 35	329.1	3	11 12	Reduction of place somewhat doubtful............	......	429
4223	9 28 30.9	128 45 39	......	..	10	Sextuple	......	810
4224	9 28 43.5	120 28 21	119.8	4	8 8′	Fine..	......	678
4225	9 29 20.6	160 23 15	230.1	12	10′ 12	Reduction of place somewhat doubtful............	......	429
4226	9 30 25.3	167 30 44	121.6	30	9 9	Δ R A = 3ˢ.0	......	782
4227	9 30 30.8	118 29 18	344±	3	10 13	Position rough	......	564
4228	9 31 29.8	121 33 34	135±	{ 1½ { 8	10 = 10 9 13	A B. Pos estim from diag .... (A + B) C.	......	678
4229	9 32 40.2	128 9 52	329.3	4	11 = 11	....	......	540
4230	9 32 56.2	167 17 29	{ 328.1 { 133.0	10 15	9′ 11 9′ 14	A B } Triple large ∗ orange red .... A C }	......	782
4231	9 32 56.9	130 53 39	204.6	12	9′ 10	....	......	772
4232	9 33 10.1	146 46 48	301.1	12	9 9′	....	......	784
	10.5	46 20	302.3	12	9 9	....	......	684
4233	9 34 35.6	110 21 34	268.8	15	8 10	....	......	561
4234	9 34 43.1	141 30 59	220±	15	9 10	....	......	440
4235	9 35 13.8	140 23 4	87.3	3	9′ = 9′	Very neat double star..........................	......	566
4236	9 36 12.0	119 58 54	50±	7	11′ = 11′	Pos by diagram	......	771
4237	9 36 13.5	119 56 54	310±	5	11′ 12	Pos by diagram	......	771
——	9 37 11.7	73 39 37	125.5	15	9 11	....	h. 142	688
4238	9 37 39.3	141 9 19	{ 50± { 230±	12 10	9 11 9 12	A B } Triple .... A C }	......	440
4239	9 38 6.5	127 49 3	193.0	12	8′ 11	....	......	540
4240	9 38 14.9	149 15 20	55.7	14	9 10	....	......	684
	16.4	15 0	54.4	10	9 11	....	......	435
4241	9 38 29.8	156 8 36	302.7	30	7 12	....	B. 2644	568
4242	9 38 53.2	130 53 20	357.8	6	8′ 10	....	......	555
	55.4	52 45	358.3	15	8 11	....	......	772
	56.5	53 8	359.3	8	8 10	....	......	554
4243	9 39 29.6	161 9 10	66.1	4	11 13	Pos 66.5, 65.8.................................	......	429
4244	9 39 33.5	120 41 10	30±	12	9′ = 9′	Very neat star; pos by diagram	......	678
4245	9 39 34.3	135 8 6	216.5	12	8 12	....	......	553
4246	9 40 34.1	127 24 24	{ 144.4 { 23.5	25 30	7 15 7 15	A B } Triple .... A C }	......	540
4247	9 41 1.9	141 14 24	87±	6	9′ 10	Large star very red............................	......	440
4248	9 41 9.7	159 0 35	312.5	10	9′ 10	Pos 314.8, 311.3, 311.5. A large star n f	......	429
	....	0 27	320.3 :	10	9 10	In an extra merid *f*. Pos ? ?	......	537
4249	9 41 32.2	124 14 3	122.9	3	8′ = 8′	Pos 123.3, 121.8, 123.6.........................	L. 4031	541
	33.1	13 39	129.1	3	9 = 9	Very neat star.................................	......	809
4250	9 42 35.6	126 11 7	72.6	12	10 = 10	....	......	572
4251	9 42 39.5	150 15 21	314.8	15	9 9′	A third ∗ 11 m near...........................	......	777
4252	9 43 —	154 18 ±	......	..	......	s f *v* Argus. A neat D ∗	......	430
4253	9 43 2.8	122 32 8	33.8	10	9′ 10	....	......	678
4254	9 43 —	134 56 —	......	..	......	Class 6. Review of B.	......	E
4255	9 44 0.2	147 54 33	79.8	6	11 = 11	....	......	435
4256	9 44 4.8	97 18 23	314.3	30	5′ 12	Glimpses between clouds	......	647
4257	9 44 11.3	139 23 50	120±	12	9′ 10	....	......	442

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4258	9 44 17.0	165 6 44	162.7	8	9 9′	....	......	782
	21.9	6 31	159.2	7	9 10	....	......	548
4259	9 44 45.5	131 43 17	162.0	3	9′ 12	....	......	554
	45.8	43 19	161.7	4	10 12	....	......	772
4260	9 44 47.9	147 25 38	118.5	15	8′ 12	....	......	543
4261	9 45 30.6	108 41 5	86.8	9	8 10	....	......	770
4262	9 45 40.8	102 8 1	101.7	7	9 12	A star 7′ m s f........	......	687
4263	9 46 41.7	149 37 50	72.3	10	9 12	Pos 71.8, 72.8........	......	435
4264	9 47 12.5	140 42 30	215±	6	10=10	Neat star........	......	442
——	9 47 37.2	134 28 53	239.0	4	7 9′	Pos 238.7, 239.3; fine	B. 2723 =	685
	37.5	28 46	238.7	6	6 10	Very ill defined	Δ. 81	773
4265	9 48 8.9	169 43 1	227.7	10	10 11	Dist by 3 oblique transits = 8″.04	......	780
	9.8	43 22	222.2	10	8′ 10			
4266	9 48 39.3	141 16 24	88±	10	9′ 11	....	......	440
4267	9 50 26.4	131 37 30	156.2	8	9 11	Pos 158.1, 154.3........	......	555
4268	9 50 28.7	123 29 27	70.4	12	10=10	....	......	448
	35.7	28 40	65.8	10	11=11	....	......	446
4269	9 51 11.6	137 36 23	316.9	15	7 12	Pos 315.7, 318.1........	B. 2758	776
——	9 51 22.3	104 8 34	313.8	12	9 11	....	h. 825	687
——	9 51 24.6	158 22 30	208.7	12	8 11	Pos 209.7, 207.8........	B. 2760	429
	....	22 57	206.5	12	8′ 9′	Pos 207.3, 205.7. In an extra merid ∫	R. 12	537
4270	9 51 27.9	165 46 30	302.5	12	10 12	....	......	548
4271	9 51 35.4	125 4 48	312.1	30	4 13	η Antliæ	B. 2759	809
	35.7	4 42	314.7	25	6 13	Large star single with 180........	......	572
4272	9 52 33.4	175 13 10	263.7	8	8′ 8′	Δ R A = 11ˢ.5	......	781
4273	9 52 39.6	134 8 37	138.1	15	8 13	....	B. 2766	685
	40.9	8 41	136.3	16	7′ 11	....	......	774
4274	9 53 2.7	139 12 25	350±	15	9′ 10	....	......	442
4275	9 53 15.9	123 52 52	63.6	2	11 12	....	......	541
4276	9 53 23.3	167 55 59	298.8	6	10 12	The middle star of 3	......	782
4277	9 54 11.4	117 50 45	29.6	25	8 8′	....	L. 4106	771
	12.2	52 13	31.7	20	8 8′	....	......	564
4278	9 54 19.7	148 27 15	{309.6 / 1.8}	12 / 16	9 10 / 9 13	A B / A C } Triple	......	435
4279	9 55 13.9	73 50 28	119.7	6	11′=11′	....	......	688
4280	9 55 55.5	122 52 41	314.6	4	9′ 13	....	......	541
——	9 55 59.0	107 16 52	270±	30	7′ 8	H. 145, No. 25	Sh. 110	675
4281	9 56 52.4	169 36 9	276.3	8	9′ 10	Neat star; Δ R A = 3ˢ.0........	......	549
	58.4	36 37	287.6	10	10 10′	....	......	780
4282	9 57 —	141 15 —	204.8	70.9	7 8	Mean epoch, 1836.537	......	E
4283	9 58 6.3	140 58 24	178.3	10	8 9	....	B. 2824	566
	6.5	59 19	182±	8	8 9	....	L. 4147	440
	6.6	58 10	182±	6	8 9	Pos estimated by meridian wire........	......	438
	6.8	58 50	182.0	8	8 9	A very fine double star	......	442
	....	....	......	..	......	Viewed in place	......	439
4284	9 58 14.0	135 4 21	72.8	10	7′ 11	L very yellow	L. 4146	774
——	9 58 36.3	108 28 14	326.0	10	8=8	....	σ. 356	561
4285	9 58 47.0	112 18 50	2.0	10	8′ 10	....	......	558
4286	10 0 —	158 32 —	195±	12	8 10	Pos est by diagram. Place very rude	......	538
4287	10 1 44.0	125 57 45	110.8	10	11=11	....	......	446
4288	10 2 36.7	165 14 49	290.5	30	8′ 8′	289.7, 291.3	......	782
	39.1	14 27	287.3	25	9=9	....	......	548

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4289	10 2 45.8	153 45 51	241.1	8	10=10	Excessively ill defined, so as hardly to be measurable	......	430
	49.9	45 56	233.6	10	10 10		......	568
——	10 3 4.9	72 48 39	95.4	2	9′ 10	Pos 94.7, 96.1	Σ. 1413	688
4290	10 3 13.6	134 57 21	305.3	15	7 11′		......	774
	16.0	56 15	310.5	15	8 11		......	776
	....	....	300±	12	8 12	Pos estimated from diagram	......	695
4291	10 3 39.0	147 49 10	216.1	2½	11=11	Among many stars	......	435
4292	10 3 57.2	154 59 21	122.0	35	6 10′		B. 2871	568
4293	10 4 5.7	105 15 4	278.8	12	9 10		......	687
4294	10 4 38.7	162 24 31	263.4	2	10 11		......	547
4295	10 5 8.0	157 51 23	36.4	20	6 13		L. 4203	557
4296	10 5 27.6	72 23 8	137.9	12	9 12		......	688
4297	10 5 52.1	144 16 29	302.6	6	10=10		......	436
	5 53.3	16 41	307.7	10	9 10		......	552
	....	16 40	302.3	12	10 11	R A not taken	......	784
4298	10 6 25.7	159 34 10	278.5	2½	11=11		......	429
4299	10 6 48.4	140 3 40	320±	50	9 9+	L yellow, S pale blue	......	442
4300	10 8 5.9	122 25 29	103.5	10	9 9′		......	535
	7.2	26 40	109±	5	10′=10′		......	678
4301	10 8 49.9	154 52 1	20.3	5	9 9	Pos 21.6, 19.7, 19.7	......	568
——	10 9 8.3	103 33 31	128.0	15	9 10		h. 831	687
4302	10 10 41.7	147 8 9	......	..	......	A double star in the vertex of a great crescent-shaped nebula.	......	552
	42.9	8 9	119.8	25	10 11′	Near the cusp of a crescent-formed nebula	......	784
4303	10 12 13.8	111 45 31	89.3	10	8 9		......	559
4304	10 12 32.5	122 16 17	289.7	12	8 11		B. 2945	678
4305	10 12 36.0	112 47 15	213.5	18	8 10	R A liable to error for want of zero stars in this ʃ..	......	558
4306	10 13 —	153 49 —	139.8	1.4	7=7	Mean epoch, 1836.501	B. 2955	E
4307	10 13 17.0	140 42 40	245±	12	8 11		B. 2951	442
4308	10 14 7.3	161 12 59	60.4 332.2	15 8	9=9 9 14	A B } Triple A C }	......	546
	25.8::	12 5	57.3	15	10=10	R A very precarious throughout this ʃ, for want of zero stars.	......	429
4309	10 14 21.5	119 28 58	50±	15	10=10	Pos estimated from diagrams	......	564
4310	10 14 33.5	173 14 45	278.0	3	9 10	Pos 278.3, 277.5; fine star	......	779
——	10 14 34.3	145 11 9	103.4 188.2	5 30	5′ 10 5′ 10	A B. Pos 103.0, 101.5, 103.7, 105.4 } A C. Triple (T *velorum*) }	B. 2972	436
	35.7	11 13	105.4 188.0	7 30	5 10 5 9	A B. Pos 106.2, 104.8, 105.1 } A C. Dist estim from diagram }	R. 13	552
4311	10 14 59.5	102 31 10	122.3	4	7 14	Exceedingly delicate, and beautifully seen	......	687
4312	10 15 28.5	137 7 13	268.1	30	7 11		L. 4276	776
4313	10 15 45.0	118 42 52	138.3	7	10=10	Points back to a ✱ 9 m.	......	451
4314	10 15 56.8	156 39 59	11.3	18	9 9		......	556
	59.1	40 31	9.1	20	8 8′		......	538
4315	10 16 18.0	133 15 48	210.3	25	9 9′		......	686
	18.9	16 1	209.6	30	9 10		......	774
4316	10 16 57.1	131 53 30	238.7	12	8′ 13		......	810
4317	10 17 36.0	135 18 38	191.7	20	9′ 12		......	694
4318	10 18 7.8	123 20 22	23.8	8	10=10		......	446
4319	10 19 40.1	143 1 25	130±	10	9 12	Pos estimated, the wire being broken	......	438
4320	10 20 14.4	138 55 0	335.0	15	9 12	Small star red	......	442
4321	10 21 45.3	119 44 12	225±	10	6 10	Very neat star (δ Antliæ)	A. 1251	451
4322	10 22 22.2	114 0 30	101.1	8	7′ 13		......	558

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4323	10 22 58.7	151 43 40	215.2	15	10 10′	....	B. 3041?	433
4324	10 22 58.9	136 28 42	64.7	5	10=10	....	......	695
	61.1	29 11	64.6	8	10=10	....	......	776
4325	10 23 54.1	120 28 16	167.7	12	8′ 9	....	......	535
	55.3	28 41	169.6	10	9′ 10	....	......	678
4326	10 24 8.5	129 3 16	65	..	......	Pos estimated from diagram	......	554
4327	10 24 —	143 38 —	352.2	113.7	8 8	Epoch 1837.099	......	E
4328	10 24 25.3	141 0 20	105.0	15	9′ 10	....	......	442
——	10 24 26.7	73 55 3	255.7	10	9′ 11	....	Σ. 1446	688
——	10 24 38.7	134 11 21	24.2	25	6′=6′	Dist by oblique transits = 16″.65. Fine ✱. [No doubt an error of 10° in reading the position, which is assumed, and a mean position used in calculating the oblique transits.]	B. 3058 + 3059	774
	41.2	11 38	37.7	15	7′=7′	....	Δ. 88	686
	41.5	12 2	34.7	20	7′=7′	Fine double ✱	......	542
4329	10 24 46.4	142 51 20	10.±	15	5 9	L white; S red. Pos estimated, the wire being broken. [*Obs gives* 56′ *for the P D, but both Lacaille and the equatorial observation agree in making it* 51.]	L. 4336	438
4330	10 25 46.2	136 7 47	160.6	30	5′ 10	L orange; S blue	B. 3069	553
	46.2	7 52	160.8	30	6 9	Pos 161.7, 159.9; L pale yell	......	695
4331	10 26 15.7	120 14 3	263.3	1½	11′ 11′	....	......	678
4332	10 26 22.5	136 6 12	160.3	25	7 11	....	......	553
4333	10 27 3.0	162 21 0	96.1	30	6 12	Large star orange coloured	B. 3083	547
4334	10 27 3.3	124 31 25	268.0	5	10=10	....	......	446
4335	10 27 14.3	159 12 39	217.5	10	9′ 10	Extremely ill defined. The stars appear like balls with photospheres.	......	556
	17.4	13 9	215.7	10	9′=9′	Pos 215.9, 215.6. Careful measures	......	546
	22.3	12 0	210.8	8	10 10	Places not good in R A in this *ʃ*, for want of zero stars.	......	429
4336	10 28 21.8	119 36 22	......	1½	10 11	Requires verifying	......	452
——	10 28 27.6	102 40 9	229.3	8	9′ 10	Pos 231.2, 227.4	Σ. 1453	687
——	10 29 7.3	153 15 36	34.8	20	9 9	B. 3013 + 3014	Δ. 93	430
	8.7	15 23	37.8	25	8′ 9	....	......	550
4337	10 29 25.8	108 28 28	246.0	5	9 10	....	......	560
4338	10 30 54.6	147 44 30	91.5	3	10 10+	A very neat double star involved in a nebula	......	435
4339	10 32 9.6	102 36 37	61.3 89.3	30 3	7 12 13=13	A and (B + C) as one star B and C (close double)	......	700
4340	10 32 21.1	123 32 28	124.8	3	11=11	....	......	446
4341	10 32 32.5	144 42 34	105.1 178.0	60 15	6 8 8 16	A B. Δ R A = 5ˢ.75; L yell, S blue .... B C. [X. *velorum. The large stars constitute the double* ✱ Δ. 95. *The nearer not noticed by* Δ.]	B. 3135 + 3136 Δ. 95	436
4342	10 33 42.9	119 51 44	52.5	18	9 13	....	......	449
	48.4	51 42	56.1	15	8′ 11	The minute in R A by this obs is 34, but there is some reason to prefer the R A of *ʃ* 449.	......	452
4343	10 33 43.1	154 11 57	98.7	3	10′ 11	....	......	550
4344	10 34 12.2	163 41 44	96.7	20	......	Dist estimated from the diagram	......	547
4345	10 34 33.4	143 13 0	340±	3	9′ 12	....	......	438
4346	10 35 —	150 8 —	81.3	26.5	8 10	Mean epoch, 1837.276	......	E
4347	10 35 39.0	149 1 10	......	..	......	The double star (g) in the catalogue of η Argus		
4348	10 35 41.9	149 4 35	......	..	......	p in the catalogue of η Argus.		
4349	10 36 28.1	129 11 33	248.8	3	11 11′	....	......	574
	28.6	11 48	243.9	2	9′ 10	Stars most beautifully defined and tranquil	......	554
	....	....	248.1	2	9′ 10	Viewed and measured; no place taken	......	810
4350	10 36 40.6	148 50 55	......	..	......	The star S in the catal of η Argus.		

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4351	10 36 41.2	157 51 15	232.3	4	10 11	......	......	557
——	10 36 45.2	150 17 15	176.2	12	9 9′	*Marked double in B. Can hardly be Δ. 97*	B. 3181	433
4352	10 36 52.2	139 59 40	220±	12	8′ 12	......	......	442
	55.2	59 59	{ 212.3 { 226.7	15 30	6′ 12 6′ 14	A B } Triple A C }	......	553
4353	10 37 8.4	148 42 17	......	..	......	(v) in Catal of η Argus	......	
4354	10 37 —	149 11 —	228.4	12	......	Z‴ in Catal of η Argus, June 21, 1836	......	
4355	10 37 18.1	149 3 49	......	..	......	t in Catal of η Argus	......	
4356	10 37 23.8	148 39 22	150.5	2	7′ 9	O in Catal of η Argus. Place from monograph, June 18, 1836.	......	
	24.6	39 30	......	..	......	Place taken in the usual course of sweeping	......	435
	....	....	147.3	2	8 11	Measured April 24, 1837	......	
4357	10 37 28.2	148 58 55	......	..	......	P in Catal of η Argus	......	
4358	10 37 29.3	149 11 34	204.7	3±	9 11	Z″ in Catal of η Argus. Measured June 21, 1836	......	
			199.4	8	......	Measured April 24, 1837	......	
4359	10 37 29.4	149 12 26	245.3	3±	9 11	Z′ in η Argus Catal. Measured June 21, 1836	......	
			238.6	6	......	April 24, 1837. 2 measures	......	
——	10 37 33.8	148 40 56	......	..	......	[*Marked as double in B. But one of its constituents is a first class double star. See next star.*]	B. 3190	
	....	....	102.7	15	......	......	......	432
	....	....	106.8	12	9′ 9′	Measured, April 24, 1837. $\left(\frac{A+B}{2}\right)$ C	......	434
4360	10 37 35.2	148 41 7	111.3	1	10 10	The triple star K in Catal of η Argus. Measure of A B taken, April 24, 1837.	......	
4361	10 37 39.2	149 2 0	......	..	......	(p) in Catal of η Argus	......	
4362	10 37 54.1	132 48 57	302±	30	9′ 9′	......	......	774
——	10 38 0.5	148 50 40	......	..	......	Star D in monograph of η Argus, marked as double in B.	B. 3194	
	....	....	206.1	12	......	Viewed and measured hastily	......	432
4363	10 38 5.3	149 7 34	......	..	......	Double star No. 597+601 in Catalogue of η Argus	......	
4364	10 38 8.5	148 27 55	......	..	......	The star γ in the Cat of η Argus	......	
4365	10 38 20.0	117 15 26	99±	10	9′ 15	The first of 3 st in an equilateral triangle	......	449
4366	10 38 24.8	148 46 57	{ 46.8 { 30.3	12 15	2 16 2 15	η Argus. The two closest stars. [N.B. These stars were subsequently effaced by the increased brightness of η.]	A. 1281	432
	28.7	47 40	35.3	12	1 17	[*The large* ✱ *much over, and the small much underrated, and the measure entitled to no confidence.*]	......	435
	29.4	47 28	......	..	......	[*True place per mean of Catalogues of Johnson, Taylor, and Rumker, used as the zero point of the micrometrical measures. See monograph.*]	......	
4367	10 38 28.6	145 39 32	157.1	7	10′=10′	......	......	784
4368	10 38 49.1	132 34 56	109.3	1½	11 12	......	......	542
——	10 39 8.7	159 58 0	{ 38.8 { 282.1	35 35	7′ 11 7′ 11	A C } Triple. Marked as double in B. Is Δ. 99 .. B C }	B. 3203	567
4369	10 39 14.0	148 35 42	......	..	......	The double ✱ β in Catal of η Argus	......	
——	10 39 14.2	104 22 4	{ 19.3 { 16.8	60 5	7 7 8 = 8	} A and ½ (B + C) } Triple ...... } B and C }	Σ. 1474	700
4370	10 39 28.9	148 40 16	......	..	......	Double star m in Catal of η Argus	......	
4371	10 39 59.9	148 38 42	......	..	......	Double star a in the same Catal	......	
4372	10 40 17.4	117 51 22	331.8	7	11=11	......	......	452
4373	10 41 14.0	130 32 22	226.1	25	8′ 9	......	......	554
4374	10 42 13.5	148 32 55	......	..	......	θ in Catal of η Argus	......	
4375	10 42 22.3	128 44 47	298.3	2	12=12	......	......	540
4376	10 42 28.7	159 37 26	126.2	15	9′ 10	......	......	546

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4377	10 44 21.1	162 42 20	276.6	3	10′ 12	....	......	547
4378	10 45 —	149 3 —	344.4	30.9	7′ 10	Epoch, 1836.164..........................	B. 3252	E
4379	10 46 34.7	138 24 50	45±	20	9 10	....	......	442
4380	10 46 37.6	158 59 20	127.6	15	9 10′	....	......	546
	37.6	60 10	125.8	15	9 12	....	......	557
4381	10 46 45.4	127 51 0	38.1	25	8′ 9	Pos 36.7, 39.6..........................	......	573
	46.2	....	38.9	30	8 9	[*This obs gives* 127 54 50 *for the* P D, *but there must have taken place some slip of the apparatus.*]	......	540
	47.2	50 53	42.3	28	8′ 9	Fine star	......	574
4382	10 48 2.2	153 4 24	8.1	15	10 11	[*The obs actually gives* 49ᵐ 11ˢ.0 *for the* R A. *But the wire was undoubtedly mistaken. See the next obs.*]	......	773
	3.7	3 46	8.4	12	9′ 11	....	......	550
4383	10 48 8.0	159 48 50	275.8	½	6 8	Pos 277.6, 273.9, 275.9. Something caught my eye with 180 indicating an elongation. Star in consequence examined with 480; superbly separated. It is one of the closest D ✻ s I have encountered in my observations.	B. 3288	567
4384	10 48 50.5	116 0 27	45±	8	11=11	Pos estimated from diagrams..................	......	689
4385	10 48 56.9	131 8 28	252.7	20	8 13	....	......	810
4386	10 49 22.5	142 35 10	10±	4	10 11	Estimated position. Wire broken	......	438
4387	10 49 24.0	146 38 38	160±	15	9 11	Position estimated. Wire broken................	......	437
4388	10 50 2.5	134 57 35	214.6	25	7 13	....	B. 3300	695
4389	10 50 12.1	120 38 47	336.7	8	9 10	....	......	444
4390	10 50 34.2	172 18 45	328.3	..	......	....	......	779
4391	10 51 4.2	123 59 7	65±	15	9 11	....	......	448
	5.8	58 9	60±	25	7′ 11	....	......	446
4392	10 51 23.7	160 26 38	159.6	25	8 = 8	159.9, 159.3. Fine double ✻	......	546
4393	10 51 23.7	158 7 59	131.5	8	6′ 9	....	B. 3314	556
	24.6	7 23	129.5	12	8 10′	....	......	538
4394	10 51 40.0	132 12 48	254.1	25	8 10	....	......	686
4395	10 52 58.7	149 25 9	3.5	4	13=13	In the following part of a cluster	......	432
4396	10 53 30.3	126 7 20	257.7	8	10 12	....	......	573
	31.4	5 56	267.2	10	10 11	....	......	446
4397	10 54 19.1	148 56 10	......	..	......	A very close double and a close triple star involved in nebula.	......	435
4398	10 54 30.8	146 20 54	255.5	8	9′ 10	Neat star	......	436
	31.4	21 31	253.9	8	9′ 11	....	......	784
	32.7	21 14	249.7	8	9′ 12	....	......	692
	34.6	21 33	250±	5	9′ 11	Position estimated	......	437
4399	10 55 28.4	149 35 58	312.5	6	10=10	Pos 313.6, 311.3..........................	......	434
4400	10 57 5.9	150 26 58	193.6	8	10 15	L red; chief of a cluster	......	432
4401	10 57 44.8	144 20 33	230±	12	10 11	....	......	437
4402	10 58 7.6	127 36 30	{ 117.7 { 85±	10 12	10 11 10 14	A B } Triple A C }	......	540
4403	10 58 54.4	133 9 3	237.0	16	8 12	....	......	686
4404	10 59 0.1	147 46 40	300.0	5	10 11	In a cluster	......	435
4405	10 59 0.9	142 21 10	45±	15	8 10	[B. 3394 does not exist.]	B. 3397	438
4406	10 59 3.4	172 59 55	10.2	8	10′ 10′	Dist = 8″.83 by 3 oblique transits	......	779
4407	10 59 6.4	133 7 43	294.1	25	8 12	....	......	686
4408	10 59 18.7	130 32 15	{ 350.6 { 150.6	12 13	8 11 8 13	A B } Triple A C }	......	810

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4409	10 59 26.1	131 42 53	270±	1½	5′ 8′	Too ill defined for measure; attempted with 320, but growing worse and worse, desisted, as I ceased at length to be sure of seeing the small star. I have, however, no doubt of its being double.]	B. 3400	554
	....	....	265±	2	6 10	Certainly double, but too ill defined for measure; only by extreme patience and waiting for glimpses could be satisfied. Very difficult.	......	555
4410	10 59 48.7	105 2 42	205.3	15	7 15	Difficult	......	700
4411	11 1 58	142 4 10	265±	3	11 11′		......	438
4412	11 1 49.6	118 40 52	269.0	12	9′ 9′+		......	452
4413	11 2 18.8	123 39 21	330±	6	10 11		......	448
4414	11 5 24.7	149 23 58	278.4	12	5 12	S E wind; dreadfully ill defined (y *Carinæ*)	B. 3462	434
4415	11 5 45.9	153 14 59	128.5	20	6 14	(This R A agrees with B)	B. 3467	773
	48.1	14 39	127.4	18	6 13	[*The star is no doubt identical with* that of ∫ 773, No. 9, but to conciliate its R A with that of the other observation, a double mistake of the 2nd wire for the first, and of 5^m error in reading the chronometer, must be admitted, which done the R A comes out as here set down.]	......	550
4416	11 5 53.3	160 30 59	161.7	12	10 11		......	546
4417	11 5 55.5	144 30 3	150±	15	9 10	A third ∗ 14 m in same line	......	437
4418	11 6 9.0	118 58 47	259.4	5	10=10	Pos 256.5, 262.0	......	452
4419	11 7 11.0	124 9 29	111.8	6	10 10+		......	446
4420	11 7 24.4	146 35 19	282.7	6	9′ 12	L red; pos 281.5, 284.0	......	476
	24.6	35 9	277.3	6	10 12		......	692
4421	11 8 1.4	136 59 48	68.7	12	6′ 10	Points exactly to a 3rd star	L. 4675	553
4422	11 8 26.5	119 11 12	351.5	7	9′ 11	Pos 352.5, 350.4	......	452
4423	11 8 29.7	134 58 36	273.8	2	9 9	Fine. Observed with 320	B. 3501	774
	34.3	57 23	282.1	1	9 = 9	Pervicinæ; measured with 320, which barely divides it; in a very fine interval between thick clouds.	......	685
4424	11 11 37.0	165 57 54	351.4	12	9′ 10		......	782
4425	11 12 —	153 39 —	......	..	......	Violently suspected to be close double, class I. Twice marked as elongated with highest power.	......	E
4426	11 13 32.8	132 37 41	175.3	18	7 13	L yellow	L. 4718	774
	34.3	37 27	176.0	25	8 13		......	542
4427	11 14 8.0	172 50 15	135.3	3	11=11	The second of a group	......	779
4428	11 14 15.6	119 58 2	280.7	15	9 11	The preceding of two	......	452
4429	11 14 19.4	149 3 40	148.5	9	9′ 11		......	435
	21.0	3 48	148.0	10	9′ 11	Ill defined	......	434
4430	11 14 43.0	119 57 52	......	18	9 11	The following of two	......	452
4431	11 14 47.2	144 5 34	222.7	12	10 11	222.0, 223.5	......	436
	47.5	5 59	220.3	15	10 10′		......	692
4432	11 16 1.9	154 1 40	280.5	1½	6 8	Suspected double with 180, and though ill defined almost sure; 320 with a triangular aperture cleanly divides it; measure good, though tremulous.	B. 3562	773
4433	11 16 46.1	72 36 5	316.7	60	7 10		......	688
——	11 17 19.8	150 42 55	292.2	4	9 10	Fine star; pos 292.7, 291.8. [*Marked as close double in B.*]	B. 3574	432
4434	11 18 42.2	144 32 34	248.5	12	9 12		......	436
4435	11 18 54.6	139 45 40	185± 305±	12 30	9 12 9 9+	A B A C } Triple	......	442
4436	11 19 6.7	143 55 20	0±	12	10 13	L very red	......	483
4437	11 19 11.6	112 46 41	324.6	12	9 10		......	559
	15.3	45 55	320±	8	10 11	Pos estimated from diagram	......	690
4438	11 19 15.5	128 56 25	196.1	18	7″ 11		L. 4750	810
	16.5	56 48	196.1	20	7 13		......	574

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4439	11 19 50.9	120 18 22	101.5	15	8 9	....	......	404
——	11 20 23.6	131 44 19	168.0	18	5′ 9	Fine star	B. 3594	554
	26.5	44 18	168.8	20	6′ 9	N.B. I find a memorandum to the effect that this star is triple, for that B 3595 is a fine 1st class double star, but I suspect some error. At all events it has not been verified by subsequent examination.	+ 3595	542
4440	11 21 20.4	167 35 29	166.1	15	7 12	A third, more remote........................	B. 3604	587
4441	11 21 54.4	144 56 28	175±	6	9 10	Position estimated. Wire broken	......	437
4442	11 22 12.7	143 43 40	230±	2½	9′ 12	Neat star..	......	438
4443	11 22 53.6	158 41 2	105.7	2	13=13	Very delicate	......	557
4444	11 23 20.1	137 44 4	139.9	12	10 11	....	......	776
4445	11 23 53.3	148 30 19	126.3	15	7 12	....	B. 3631	432
	56.8	30 33	129.7	20	6 12	L very yellow. The preceding and northern of two yellow stars, 6 m.	......	543
4446	11 23 54.4	141 31 18	117.5	12	10=10	....	......	576
——	11 24 —	118 19 52	29.9	6	6 = 6	Pos 29.4, 30.4 (17 Hydræ = H. III. 96). The obs gives 7.9 for the seconds of R A, which arises from the moveable wire having been mistaken for the fixed.	A. 1354	452
4447	11 24 30.4	153 0 25	348.8	20	9′ 10	Points to two large stars	......	550
4448	11 24 39.8	132 45 28	91.1	6	9 11	....	......	686
4449	11 24 40.9	120 55 2	170±	60	4′ 11	ξ Hydræ	A. 1356	444
4450	11 24 47.9	162 57 33	36.9	20	8 11	....	B. 3645	585
4451	11 25 21.1	135 22 35	212.0	12	7 13	....	......	553
4452	11 25 24.2	152 57 21	321.1	..	......	....	......	550
——	11 25 54.3	72 15 15	217.0	3	7′ 8	217.4, 217.7, 215.8; 90 Leonis. [There can be no doubt that these measures are all misread 10°. See all earlier measures of this star.]	Σ. 1552	688
4453	11 26 12.8	138 27 30	130±	9	9′ 10	Very neat star................................	......	442
4454	11 26 49.5	124 13 57	30.5	15	9 11	....	......	446
4455	11 28 —	122 38 —	244.9	4.0	6 9	Mean epoch, 1837.031	B. 3670	E
4456	11 28 14.4	113 30 15	122.9	20	8 12	....	......	690
	16.1	30 1	120.5	25	7 11	....	......	559
4457	11 28 39.7	149 8 0	115.8	2	13=13	Has a bright star n p........................	......	435
4458	11 28 53.9	162 57 28	37.3	15	7 10	....	......	547
4459	11 29 41.2	137 58 25	160±	10	10=10	A 3d ✱ 9′ m n p	......	442
4460	11 31 4.2	146 47 53	178.0	10	8 9	Pos a good estimation by meridian wire	B. 3696	437
	6.9	47 59	177.3	10	8 9	Clouds	......	692
	7.3	48 14	177.7	10	7′ 9	Pos 177.6, 177.8..............................	......	436
4461	11 31 20.3	155 3 57	{ 124.3 { 37.1	4 10	9′ 12 9′ 14	A B } Triple A C }	......	550
4462	11 31 45.7	172 7 40	258.7	6	9 10	Very neat star................................	......	779
4463	11 32 6.3	122 38 8	248.3	2½	6 8	Fine star, large ✱ yellow	......	541
4464	11 32 11.1	132 12 53	158.7	12	9′ 10	....	......	686
4465	11 33 16.0	121 32 48	44.5	60	6 10	....	B. 3721	445
	17.4	33 34	315±	7	7 13	A third, larger than 13 m	......	443
4466	11 34 4.5	148 1 35	317.7	4	11 11′	....	......	435
4467	11 35 15.2	136 9 43	144.3	12	9 10	....	......	553
	16.2	9 59	144.8	18	9′ 10	....	......	776
4468	11 35 17.3	172 9 30	158.6	15	......	Large ✱ yell. Small blue	......	779
4469	11 35 42.9	74 26 31	166.1	30	9 9	....	......	688
4470	11 36 59.7	119 32 46	318.2	6	9 10	....	......	445
4471	11 37 37.8	155 47 36	272.9	..	5′ 14	Δ R A = 8ˢ.0................................	B. 3756	568
4472	11 37 49.7	118 15 12	39.5	12	9′ 10	....	......	452
4473	11 39 39.2	138 4 54	98.7	12	9 13	....	......	566

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4474	11 40 6.0	143 12 20	95±	15	8 10	......	......	438
4475	11 40 47.1	150 30 18	125.4	2	10 11	A close double star	......	434
4476	11 41 5.3	137 19 23	171.1	20	9′ 10	In the following part of a cluster	......	776
4477	11 41 49.3	109 53 4	108.3	15	8 9	Too ill defined for measure	......	561
4478	11 44 18.2	122 57 35	341.1	2	5 5′	Pos 341.3, 340.8 (β. Hydr and Crat)	A. 1378	541
	18.4	57 27	331±	2	5 = 5	Almost a perfect separation, but the position of the telescope does not allow following it, though a longer examination would be desirable.	......	444
	18.9	57 27	337.7	1½	4 5	Tremulous and ill defined	......	572
	19.3	58 0	342.7	1½	5 5′	Pos 341.5; 344.0; well divided with triangular aperture and a passable measurement.	......	445
	22.2	57 45	337.5	1½	5 5′	Triangular aperture	......	446
4479	11 44 44.4	113 38 55	90.8	5	9 10	Neat star	......	690
4480	11 46 8.9	143 43 13	184.5	3	9 13	The most southern, but one of 4 stars 9 m	......	576
——	11 46 37.0	151 38 0	263.7	20	9 10	[*Marked as double in B*]	B. 3828	432
——	11 48 7.0	121 19 11	81.4	20	8 8	A third star 12 m farther	B. 3836	445
	7.0	19 17	79.5	20	8 = 8	......	Δ. 116	444
	7.7	19 59	85±	20	9 = 9	A third, 13 m northward	......	443
4481	11 48 39.8	111 35 30	198.3	3	8 = 8	Pos 197.9, 198.8. Fine ✻	......	690
4482	11 49 17.5	132 46 10	292.7	15	8′ 14	......	......	788
4483	11 49 22.3	160 25 22	105.3	12	10 = 10	......	......	583
	25.3	25 5	108.3	12	9′ = 9′	......	......	567
4484	11 49 43.5	129 59 42	299.2	1½	6 12	Very delicate and beautiful. Small star perfectly seen and well defined.	B. 3850	810
4485	11 50 46.8	131 22 39	181.7	18	9′ 10	......	......	554
4486	11 51 —	167 16 —	178.3	1.6	6 6′	Mean epoch, 1836.136; ε *Chamæleontis*	B. 3865	E
4487	11 51 36.5	125 48 20	126.5	3	9 9	......	......	573
	....	....	128.3	3	9 10	Viewed and measured, but no place	......	574
4488	11 51 43.0	150 25 10	140.6	6	9′ 11	Pos 143.1, 138.1, 140.7	......	432
4489	11 51 47.5	113 31 0	147.8	8	9 = 9	Neat star	......	690
4490	11 53 55.1	174 41 15	144.6	30	6′ 10	......	B. 3884	779
	66.1	42 ±	143.7	20	7′ 10	y + B; Δ R A = 10ˢ.5; fine ✻	......	781
4491	11 55 1.1	133 10 18	41.8	30	9 9	......	......	686
	5.0	10 35	42.4	28	9 9	Points to a third ✻ 14 m	......	788
4492	11 55 7.4	143 46 23	272.7	15	8 12	......	B. 3897	576
4493	11 55 52.7	145 40 0	90.9 311.6	8 15	9′ 10 9′ 14	A B A C } Triple	......	784
4494	11 56 59.4	138 54 24	71.4 7.7	15 20	9′ 9′ 9′ 11	A B A C } Triple	......	566
4495	11 57 22.1	122 0 44	319.0	4	7′ 9	Fine star	B. 3918	445
	22.6	0 32	318.8	3	7 9	A very fine double star	......	444
4496	11 57 27.6	107 57 19	30.0	10	8 9	Too ill defined	......	561
4497	11 57 28.1	136 48 52	323.9	6	11 12	......	......	776
4498	11 57 36.2	154 45 56	58.8	15	7 9	Pos 58.3, 59.3. Fine star	B. 3921	581
4499	11 57 42.3	125 57 25	45.9	12	10 = 10	......	......	571
4500	11 57 54.6	126 55 3	32.7	50	6′ 9	......	B. 3922	574
4501	11 58 8.0	153 39 57	297.7	30	5′ 11	(η Crucis)	B. 3923	550
4502	11 59 48.7	165 31 49	359.3	18	9′ 10	......	......	586
——	12 0 37.3	100 53 27	89.9 93.0	12 60	7 9 7 8	A B A C } A white, B very ruddy, C white	Σ. 1604	591
4503	12 1 52.9	147 52 10	249.8	6	9′ 11	......	......	435
4504	12 2 45.6	172 24 35	214.4	30	6 10	......	......	779
——	12 2 53.4	96 39 2	272.3	5	10 11	......	h. 845	697

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4505	12 2 55.5	119 39 53	267.3	12	8′ 13	A fine double star	......	564
	55.8	42 17	270.0	12	8 12	[*P D uncertain, owing to a sudden jump in the zero stars. The former to be preferred.*]	......	452
—	12 2 57.5	105 50 26	280.8	8	6 8	Fine double star	σ. 402	687
4506	12 2 58.3	113 1 45	15.8	4	8 13	An elegant object	......	690
4507	12 4 2.2	133 57 3	227.4	20	8 9	....	......	686
	2.5	57 10	226.9	20	9 10	....	......	788
	13.5	56 36	222.9	20	9 10	[Probably 10ˢ error in time]	......	455
—	12 4 59.7	134 46 37	247.2	4	5′ 7	Pos 245.9, 248.6. Both stars yellow; a very fine object.	B. 3967 R. 14	776
4508	12 5 54.6	144 50 19	32.4	30	9 10	....	......	692
	56.6	50 20	32.6	30	9′ 10	....	......	784
—	12 6 24.9	96 17 53	289.3	10	8 = 8	Fine star	Σ. 1619	697
4509	12 7 30.9	116 9 37	124±	25	9 12	Too ill defined for measure	......	689
4510	12 7 56.2	126 32 18	35.8	12	9′ 10	A third ✻ 10 m nearly n of B, dist 10″	......	574
4511	12 9 2.7	144 34 24	302.1	12	10 10′	....	......	692
4512	12 9 15.0	153 3 35	323.5	30	5 16	ζ Crucis. [Small star probably underrated.]	B. 3994	431
4513	12 10 6.5	122 20 44	93±	25	8′ 11	....	......	445
4514	12 10 19.3	116 29 17	116±	12	10=10	Very ill defined	......	689
4515	12 10 52.1	158 49 47	51.1	15	9 11	....	......	583
—	12 12 20.8	100 31 27	170.3	15	9′= 9′	....	Σ. 1635	591
4516	12 14 29.5	153 2 51	98.5	15	8′ 11	....	......	568
4517	12 14 37.5	109 18 54	186.3	15	8 9	....	......	561
4518	12 15 9.2	130 25 56	208.1	10	8 10′	[Lacaille's R A exceeds this by 35ˢ. A mistake in the wire supposed would give 12 15 49.1.]	L. 5138	456
	....	....	209.0	10	8′ 11	L fine yellow, S blue; past merid..............	......	458
4519	12 15 10.7	121 27 4	90±	5	10=10	....	......	443
4520	12 15 21.1	141 53 10	215±	35	9 9′	....	......	438
4521	12 15 29.3	121 57 59	279.5	6	10 12	....	......	445
—	12 15 36.4	147 10 35	335.6	4½	9 = 9	Pos 335.6, 336.8, 334.3. [*Marked as double in B.*]	B. 4042	435
—	12 17 11.2	152 9 30	119.0	4½	3 = 3	A B. Pos 121.6, 120.5, 117.2, 116.3; *α Crucis* ..	AC. 1426	432
			197.7	120	3 5	A C. Pos 198.6, 196.8..........................	+ 1427	
			148.7	60	3 13	A D	Δ. 122	
			119.3	100	3 14	A E	R. 15	
			93.7	120	3 13	A F. [The angle probably misread 10°. The diagram agrees with this, and the true reading was doubtless 103.7.]		
	11.5	9 15	115.6	5	2 2	A B	......	431
			197.8	120	2 5	A C.		
			146.2	60	2 12	A D.		
			118.7	100	2 15	A E.		
			107.1	130	2 13	A F.		
	....	9 15	118.7	..	......	A B	......	778
			155.6	..	......	$\left(\frac{A+B}{2}\right)$D.		
4522	12 17 22.0	158 32 7	61.8	5	8′ 9	[*Query if* R A *should not be* 12ʰ 16ᵐ, *which has twice been registered in the equatorial measures.*]	......	557
4523	12 17 59.6	146 40 26	276.0	7	10′ 11	....	......	784
4524	12 18 46.6	149 5 48	338.9	30	9 11	....	......	434
4525	12 20 24.2	146 52 48	......	..	......	Double. No description	......	784
4526	12 20 56.3	142 15 30	263±	12	9 9′	A third n f	......	438
—	12 21 46.2	146 9 39	38.0	120	2 5	Pos 37.5, 38.4 (γ Crucis)	Δ. 124	436
—	12 22 47.1	100 8 43	191±	15	9 9′	....	Σ. 1649	591
4527	12 24 18.2	112 53 47	94.3	2	11=11	....	......	558

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4528	12 25 13.9	121 9 30	163.8	15	7′ 12	....	L. 5205	445
4529	12 25 19.6	168 2 59	322.6	8	9 13	....	......	586
4530	12 25 42.6	136 20 28	243.8	8	9′ 14	....	......	553
	....	....	236.9	8	9′ 13	Viewed and measured past merid	......	776
4531	12 26 40.7	141 16 5	15±	15	9′ 10	....	......	438
——	12 26 52.6	101 5 10	......	..	......	An elegant triple star forming nearly an equilateral triangle. Between 2 bright stars, 7 m.	Σ. 1639	591
4532	12 26 56.2	122 10 4	265±	4	10 11	....	......	443
4533	12 26 59.6	128 55 35	77.5	30	6 12	....	L. 5214	456
——	12 27 26.9	97 21 4	312.7	12	9′=9′	....	h. 848	697
4534	12 28 38.8	147 10 8	279.5	15	10=10	Δ R A = 2ˢ.0	......	434
	39.3	10 20	278.4	12	10=10	....	......	435
4535	12 28 51.5	156 15 39	336.4	7	7′ 12	....	B. 4126	580
——	12 29 29.0	100 34 51	267.7	20	8′ 10	L red, S blue-green	Σ. 1664	591
4536	12 29 58.2	133 50 10	101.7	15	9 11	....	......	455
4537	12 30 18.3	119 51 24	355±	12	9 11	....	......	443
4538	12 31 44.1	172 43 45	274.2	4	10 10′	Neat star................	......	779
4539	12 32 11.0	138 1 46	340±	..	......	(γ *Centauri.*) [Pos estim from diag.] Seen decidedly elongated in a position as per diagram, with 320 and triangular aperture, but all attempt at a measure confounded by constant boiling and working of the star.	A. 1463	766
	11.1	1 14	340.8	⅔	4=4	180 with triangular aperture shows it elongated; 320 fairly double and almost divided. Pos with 320 = 338.3, with 480 (which shows a black division) = 343.3.	......	566
	11.9	1 33	340±	..	......	Seen decidedly elongated with 320 and diminished aperture, but so violently agitated and ill defined that no measure could be got. That set down may err 20°.	......	695
	13.3	1 12	......	..	4	(γ *Centauri.*) A star 4 m, which I am very much inclined to believe close double, but could not verify it owing to bad definition. Tried 320, but it will not bear that power.	......	553
——	12 32 24.5	102 4 53	120±	4	7=7	A very fine double star	Σ. 1669	591
	25.0	4 33	125.3	5	7 7′	Fine star, but ill defined............	......	698
4540	12 32 25.5	161 51 12	170.0	15	9=9	Pos 171.9, 168.6, 169.6............	......	583
	33.6	15	165.4	20	9=9	....	......	567
	38.4	50 53	166.3	15	9 9′	Pos 166.6, 166.0............	......	569
4541	12 32 29.7	152 2 14	130±	..	......	In cluster. Pos est from diag?	......	778
4542	12 33 35.8	113 40 35	60.6	30	7′ 12	....	......	690
4543	12 33 45.3	147 57 53	98.4	25	9 11	Large star red............	......	434
4544	12 33 54.0	168 31 54	299.3	2	8 14	At times sure of the existence of the small star, at others I cannot see it. It will not bear power to-night. I should like to see it again, though on the whole there is hardly a doubt. e e difficult, however.	......	783
	....	....	......	..	......	Viewed again, past merid, the stars being now much clearer and better defined. No doubt remains. I see the small star steadily, but it is e e F, and not above $2\frac{1}{2}''$ dist. Power 240 insulates it completely.	......	783
4545	12 34 49.4	164 15 9	189.3	12	9′ 9′	Pos 189.4, 189.3............	......	569
4546	12 35 14.7	141 49 23	222.1	15	8′ 10	Pos 221.6, 222.7............	......	576
4547	12 35 41.0	150 2 53	52.8	18	8 11	L red, S blue	B. 4178	434
	41.6	2 42	47.3	25	7 10	L yell, S bluish	......	432
4548	12 36 40.1	145 32 24	173.5	70	5 9	....	B. 4182	436
4549	12 36 55.7	113 30 30	135±	15	10′ 11	....	......	690

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4550	12 37 56.2	156 12 46	93.4	15	8 9′	....	B. 4191	568
	58.4	11 18	89.3	12	8′ 9	Neat double star...........	......	557
4551	12 39 10.5	113 53 4	321.2	20	10=10	Between two B stars	......	588
	13.2	53 30	317.5	12	10 10′	Has a L ✻ s p, and another n f	......	690
4552	12 41 44.2	135 55 59	313.7	25	9′ 10	....	......	695
4553	12 42 10.1	118 49 13	348.6	8	10 11	....	......	564
——	12 42 31.6	99 25 3	308.3	30	8 9	....	Σ. 1682	698
4554	12 42 35.5	120 8 46	28±	18	6 10	....	L. 5301	449
4555	12 44 10.2	132 8 40	302.1	25	8 13	....	B. 4233	788
——	12 44 39.6	146 14 29	15.5	45	5′ 6	Pos 16.1, 15.0...........	A. 1485	784
	39.7	15 9	15.9	40	5 6	Pos 16.5, 16.4, 15.2	Δ. 126	436
4556	12 45 7.1	117 2 18	83.0	7	8 10	....	......	564
	10.0	2 2	84.3	4	6′ 8	Fine D star, but ill defined	......	689
4557	12 45 43.7	137 28 46	349.5	15	9′ 11	....	......	695
4558	12 46 41.1	119 13 0	182.8	20	9′ 9″	Obs gives R A 12 47 12.7, but if a mistake of the wire be presumed, the result is as here set down.	......	450
	41.7	12 39	181.1	20	9 = 9	Well measured	......	449
4559	12 47 2.3	126 28 1	158.0	12	9 12	....	......	460
4560	12 48 36.7	128 0 0	251.4	25	7 14	[Pos 215.4 *in MS., but this is irreconcilable with the diagram, which represents the small star as about* 20° *s p* (*or in pos* 250), *so that no doubt the reading must have been* 251.4, *and the figures transposed in the writing down.*]	B. 4263	460
	40.0	1 0	251.4	25	6 13	[*In this obs the pos as measured agrees with the diagram.*]	......	573
4561	12 49 30.5	166 55 54	41.3	12	10 10′	....	......	587
——	12 49 51.2	144 58 41	128.8	25	9 9′	B. 4268 + 4271...........	Δ. 127	784
4562	12 49 51.6	137 36 31	72.7	12	9 9′	....	......	553
4563	12 51 45.2	122 42 17	229±	5	7′ 8	The 2nd of 3. The 3rd is north of both...........	L. 5360	701
4564	12 52 43.1	144 45 24	221.6	18	9 11	Pos 221.8, 221.3. Both red...........	......	436
4565	12 52 44.3	171 48 25	75.3	28	8 11	Δ R A = $12^s.5$	B. 4290	779
4566	12 55 1.2	167 32 10	219.4	15	6 15	Points exactly to a 3rd ✻ = 14 m	B. 4306	587
4567	12 56 27.2	137 32 33	87.3	15	5 13	f Centauri. A most beautiful object, but ill defined to-night. Bears lamp illumination.	B. 4316	695
	27.8	32 6	83.3	12	5′ 16	Pos 82.0, 84.7. The most delicate object imaginable, but too ill defined for measures.	......	553
	....	....	81.9	10	5′ 14	Viewed. A most beautiful object. Another measure gave 78.8, but this was condemned on re-examination.	......	776
4568	12 56 51.1	151 12 13	278.6	12	9′ 11	Large star very red...........	......	432
	53.4	11 15	270.3	15	9 12	L very red, S white	......	596
——	12 57 13.6	154 23 46	185.0	4	7 10	Fine ✻. Pos 185.2, 184.7	B. 4323	568
	15.3	23 42	187.0	5	7 9	(θ *Muscæ.*) Fine ✻. Pos 187.8, 186.3	Δ. 129	581
4569	12 57 47.2	145 46 29	242.0	4	8′ 11	Fine. Pos 241.8, 242.2	B. 4330	436
	47.5	46 14	238.0	6	7 10′	Pos 236.8, 239.3. Fine ✻	......	784
4570	12 58 16.6	126 16 40	226.0	15	9′ 10	....	......	460
4571	13 2 1.7	124 13 11	266.4	15	7′ 10	....	L. 5426	446
4572	13 2 21.3	121 21 57	307.4	25	9 9′	....	......	701
4573	13 3 23.2	145 21 34	56.5	4	10 11	....	......	436
4574	13 4 40.8	121 20 37	163.3	18	8 13	....	......	701
4575	13 5 25.7	116 57 42	76.1	20	9 9	....	......	689
	26.2	57 30	74.4	15	9′ 10	....	......	453
4576	13 5 39.8	146 9 47	129.7	6	7 10′	Pos 129.8, 129.6	B. 4378	784
——	13 6 1.2	100 27 12	53.1	50	7 8	....	σ. 434	591
	2.2	27 38	58.5	45	6′ 7	....	......	698

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4577	13 6 2.2	148 55 5	{ 231.6 { 53.8	15 6	9 9 9 11	A B } Triple A C }	......	790
4578	13 8 2.2	126 6 32	159.1	8	7 12	....	......	572
4579	13 10 18.2	153 9 46	98.0	2½	9 9′	Pos 96.9, 99.1. Fine star..................	B. 4411	568
	18.5	9 8	98.5	3	9 9′	Pos 99.4, 97.6. Elegant object	......	581
——	13 11 43.1	150 5 42	342.6	70	6 7	Coarse. B. 4420 + 4421....................	Δ. 133	790
	46.1	4 47	342.3	60	5′ 7	(z 1 + z 2 Centauri).........................	......	596
4580	13 13 —	137 40 —	10.2	1	8 8	Epoch, 1836.192	B. 4431	E
4581	13 13 7.4	168 53 14	281.9	10	10′ 12	....	......	783
4582	13 13 41.8	163 17 52	23.0	15	9 11	....	......	569
4583	13 14 0.9	153 35 46	232.0	40	5′ 12	....	B. 4437	568
4584	13 14 36.2	173 30 45	270.3	8	11=11	....	......	779
4585	13 15 32.2	173 34 55	300.3	15	10 11	Δ R A = 5ˢ.5..................................	......	779
4586	13 16 —	156 59 —	149.4	3.7	8 10	Mean epoch, 1837.450	B. 4460	E
——	13 16 28.0	96 41 14	77.3	4	9 10	A beautiful D star	Σ. 1743	697
4587	13 16 33.0	132 9 40	90.0	3	10′ 10′	Pos by parallel wire	......	788
4588	13 17 27.8	129 16 36	141.4	30	6 12	....	L. 5548	460
4589	13 18 42.1	144 1 27	99.3	25	8 11	....	L. 5551	784
4590	13 18 44.6	166 40 44	136.6	25	6′ 11	....	B. 4474	782
4591	13 20 6.0	150 3 21	46.7	6	10′=10′	In centre of a F but much comp cluster. [N.B. This obs gives for the minute of R A 21, and for the degree of P D 149. Both are wrong, by comparison of this and the next obs. In ∫ 596, an object whose N P D = 149° 3′ could not have been observed.]	......	790
	6.8	1 59	45.2	3	11=11	In a cluster..................................	......	596
4592	13 20 14.7	149 49 10	222.8	12	7′ 15	Points a v l south of a 3rd star, at about 3 times the distance.	......	582
4593	13 23 0.9	112 6 55	90.3	20	9 = 9	R A uncertain for want of zero stars	......	589
4594	13 24 20.6	169 42 29	99.5	6	10=10	A neat double star	......	783
4595	13 25 29.6	124 45 45	100.6	6	10=10	Neat...	......	446
	30.2	46 7	94.8	10	9 9	Mean of 93.7, 95.8..........................	......	572
4596	13 25 37.5	154 53 59	94.5	1	8′= 8′	Pos 94.3, 94.8. Power 320 and large equilateral triangle aperture, beautifully defined.	B. 4540	581
4597	13 26 22.5	119 45 28	195.1	2½	10 11	....	......	564
——	13 27 26.1	115 37 23	194.9	6	6′ 7	Fine ✻. Pos 195.3, 194.5	A. 1552	453
	26.5	37 22	191.4	10	6 7	Too ill defined for measure (f Hydræ)............	Δ. 138	689
4598	13 27 29.8	164 15 13	40.5	15	5 14	....	L. 5592	569
4599	13 27 42.9	119 4 28	......	..	......	A double ✻ s f a nebula	......	451
——	13 28 41.4	96 59 53	220.8	3	7′ 8	Fine double star (81 Virginis)	Σ. 1763	697
4600	13 28 49.4	138 7 42	120.0	15	8′ 10	....	......	693
4601	13 29 14.8	128 49 24	277.6	5	9′ 9″	Wind gusty..................................	......	460
4602	13 29 58.3	134 50 30	189.3	30	9 9′	....	......	788
	60.1	50 0	190.1	25	8′ 9	....	......	776
	61.1	50 40	190.4	20	9 9′	[This obs gives P D = 135° 0′ 40″, but the other observations show by their agreement that this is 10′ wrong read off.]	......	463
4603	13 31 8.7	139 46 24	146.1	12	9 10	....	......	564
4604	13 31 15.5	117 22 25	282.8	15	8 11	....	......	453
	17.1	23 18	287±	15	7 9	....	......	449
	17.1	23 44	281.5	15	7′ 10	....	......	456
4605	13 31 41.4	119 3 8	281±	15	9 11	Has a nebula following	......	564
4606	13 32 11.6	112 35 25	350.8	30	7 11	....	......	690
	18.2:	36 30	355±	25	8 11	R A uncertain for want of zero stars	......	589

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4607	13 32 17.8	161 8 20	73.7	12	9′ 11	......	......	598
	21.9	7 5	78.6	12	9′ 11	......	......	567
4608	13 32 34.1	123 6 42	172.8	4	8 = 8	Pos 173.0, 172.7	L. 5649	572
	35.0	6 42	167.7	4	9 = 9	Very fine star	......	446
——	13 32 38.9	148 21 26	89.8	30	8 9	Δ R A = 5ˢ.0. [Δ. 142, *but no stars 14 m noticed between the two large ones.*]	B. 4597 + 4598	582
4609	13 33 37.1	126 48 40	150.4	8	9 10	......	......	573
——	13 33 53.1	114 6 56	71.4	25	8′ 11	......	h. 2671	453
4610	13 35 31.7	169 25 9	311.4	25	7 13	......	......	783
4611	13 35 48.9	128 36 8	100±	3	10=10	......	......	460
——	13 36 53.2	101 34 23	160.3	25	6 12	......	Σ. 1780	698
4612	13 37 0.4	125 23 57	346.6	25	5′ 14	......	B. 4627	572
	1.0	24 11	......	..	......	Query if it have not 2 companions	......	446
——	13 37 28.7	151 14 1	35.8	15	8 8	Pos 37.0, 34.7. L red, S green = Δ. 143	B. 4629 + 4630	596
4613	13 37 37.9	119 30 58	220±	15	9′ 9′	Has a v F nebula near it following	......	451
4614	13 38 18.3	132 17 55	277.8	15	9′ 10	......	......	788
4615	13 38 30.6	147 13 7	145.5	15	9′ 10	Both yellow	......	694
——	13 39 5.0	136 31 17	258.0	10	9 10	Pos 258.2, 257.7	Δ. 144	695
	5.3	31 41	260.9	7	9 9′	......	......	463
	5.9	30 51	259.9	8	9 9′	......	......	464
4616	13 39 9.8	160 19 20	347.5	2	9′ 12	......	......	567
4617	13 41 5.3	119 1 58	255±	4	8 12	An elegant double star	......	564
——	13 41 10.6	141 57 48	285.8	18	7 8′	Pos 285.6, 287.8, 285.1. ? if Δ. 147. Is certainly R. 18.	B. 4655 + 4656	576
4618	13 41 11.6	128 37 22	339.6	12	9 11	......	......	460
4619	13 41 32.2	137 1 3	196.8	20	8′ 10	......	......	464
——	13 42 2.1	122 8 27	112.2	15	6 7	(k Centauri = Δ. 148. Pos 112.4, 112.3, 111.9; good measures with triangular aperture.	B. 4662	701
4620	13 42 8.6	146 58 4	83.5	2	11=11	85.0, 82.0	......	436
4621	13 42 8.6	162 59 3	319.5	15	10=10	......	......	585
4622	13 42 49.7	155 18 56	262.3	3	10 10′	Neat star	......	568
4623	13 43 20.0	128 32 0	332.0	5	8 14	The last of 3	......	460
4624	13 43 26.9	136 17 27	355.4	15	6 12	......	B. 4668	463
——	13 43 28.0	121 5 37	183.6	18	6′ 9	(h Centauri.) *Marked as double in B*	A. 1580	701
——	13 43 54.0	139 51 4	77.5	20	8′ 8′	[Marked as double in B]	B. 4672	566
4625	13 44 3.4	131 44 20	9.5	12	9 9′	......	......	457
	9.7	44 43	7.4	15	9 10	[*Obs makes R A 47ˢ.6; wire mistaken*]	......	686
4626	13 44 16.7	159 28 40	53.8	3	11=11	......	......	567
	....	29 45	60.0	3	9′ 9′	A rough estimation of Δ R A from a foregoing star makes the R A 6ˢ.7 in this observation.	......	584
4627	13 44 22.5	161 8 5	271.3	8	9′ 12	A third star 12 m near	......	584
4628	13 45 —	136 27 —	......	..	3′ 11	ζ Centauri, class IV.	......	E
4629	13 45 37.0	167 34 19	356.5	4	10 10′	......	......	782
4630	13 45 44.8	154 48 33	311.7	5	8′ 9	......	......	580
	45.8	48 22	313.1	4	8′ 8′	Pos 314.8, 314.1, 310.3; another s f	......	581
4631	13 45 50.0	159 33 5	86.2	12	10 10	Almost the first in a cluster	......	584
4632	13 45 56.3	154 57 57	9.3	6	6 11	Pos 9.5, 9.1. The following and southern of 2 double stars.	L. 5740	581
4633	13 46 0.0	146 52 44	{ 267.9 { 301.4	70 12	7′ 10 10 14	A B } Triple B C }	......	436
4634	13 46 4.3	145 11 38	310.6	8	9 11	[This cannot be Δ. 151, as he makes the position exactly north.]	......	694
4635	13 46 37.2	167 50 4	250.7	12	10 10′	......	......	783

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4636	13 47 29.9	129 8 53	29.6	1½	10 10′	Pos 30.5, 28.7. Place by a hurried and imperfect observation. Viewed also by Mr. Maclear and a friend.	......	461
	32.6	8 20	22.2	1½	10 11	A double star involved in a very evident nebula 2′ or 2½′ in diameter. Three stars are near it; one E 9 m, and two others (C D), 13 m. Pos of the middle star D of the three from the double star = 28.°3. See Plate VI. fig. 10.	......	573
	33.7	8 49	......	2	9 = 9	A close double star in a very evident large bright luminous atmosphere, 2′ diameter. A neighbouring star quite as bright has no such photosphere. The star was not noticed as double, till too late for procuring a satisfactory measure (41.3 ± was taken), verified with 240 and 320. Wind hot from north, and furious, but definition excellent.	......	460
	34.1	9 23	27.3	1¼	10 11	Pos 27.3 by direct measure of A B. The line of junction passes about one diameter of the small star (D) on the side towards (C), between the stars C D. When better seen, I judge the line of junction to pass as much *outside*, or to the following side of D, and in this opinion I remain. 28.3 is the measure of A and D carefully taken; and if we say 28.3 for the position of A B, it will probably be not 1° wrong. 22°, as in ʃ 573, is certainly too small.	......	574
	....	....	25.8	2	10 = 10	Pos 24.9, 26.7. In v F neb. A ✻ 9 m follows about 4′ dist.	......	718
4637	13 48 4.7	101 42 58	124.6	15	9 = 9	....	......	698
4638	13 48 59.4	136 23 12	{ 315± { 125±	5 4	10 12 10 13	A B } A C } Curiously triple	......	464
4639	13 50 41.0	118 26 18	342.4	6	9′ 10	....	......	451
4640	13 52 10.6	99 33 23	134.3±	4	9 = 9	I think it is double, but the night is so very unsatisfactory that I cannot get a sharp glimpse.	......	698
4641	13 54 16.1	157 35 35	66.6	12	9′ 11	....	......	579
4642	13 54 34.9	152 37 18	{ 5.3 { 336.8	8 25	8 16 8 11	A B } A C } A B extremely difficult and delicate	B. 4751	581
4643	13 54 38.0	126 27 10	139.5	15	7′ 11	A 3rd 9.10 m s p. The R A is 38ˢ too great for identity with L. 5798, but a mistake of 2nd wire for x (or leaving field) reconciles the discordance, and gives 13 54 4.8.	L.5798?	459
——	13 55 24.0	125 43 25	129.5	..	......	....	Δ. 154	446
4644	13 55 32.6	172 42 35	69±	8	11 = 11	....	......	779
4645	13 55 47.2	146 53 4	231.8	10	9′ 11	....	......	436
4646	13 56 6±	137 31 ±	125±	..	......	A fine double star, class III. in a cluster. Pos by estimation of diagram.	......	463
——	13 56 28.7	142 52 7	27.1	18	8′ 9	Large star very red, S blue. Δ. 155?	B. 4763	468
4647	13 56 39.6	137 30 9	295.9	4	10 = 10	The middle of a semi-ellipse, formed by seven stars 10 m, which itself forms part of a cluster.	......	695
	41.7	29 11	294.5	5	9′ = 9′	The middle of a semi-elliptic group in a cluster	......	464
4648	13 56 58.0	166 31 54	208.0	15	10 10′	208.4, 207.7	......	782
4649	13 57 8.0	148 54 45	64.4	12	8′ = 8′	Pos 65.0, 65.0, 63.3. Both stars of a fine rose red colour, or rather a brick red. A star 8′ m, which precedes at 3′ dist, is purely white.	......	790
	10.4	54 14	69.4	10	9 = 9	Pos 70.3, 67.8, 70.0. Both stars are of a full scarlet colour. Two small stars s p and a large one preceding are white. A very interesting and remarkable object. When a little lamp light is in the field, the stars of the double star appear of a fine rose red, the others snow white.—[N.B. As the measures 64.4 and 69.4, differing 5 degrees, are each the means of three measures, there can be very little doubt of a rotatory movement. The interval of the observations is 2 years and 35 days: 1835, May 3; 1837, June 7.]	......	582

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4650	13 57 13.4	118 22 53	62.4	10	8′ 11	....	......	451
4651	13 58 —	140 42 —	134.0	63.0	6 9	Mean epoch, 1837.006	B. 4778	E
4652	13 58 19.2	164 57 17	79.4	15	9 12	....	......	585
4653	13 58 21.9	132 39 0	34.8	25	6′ 14	....	B. 4777	788
4654	13 58 27.6	155 57 21	9.2	10	9 11	Pos 9.0, 9.5	......	568
4655	13 59 53.2	126 10 5	268.5	5	9′ 11	....	......	446
	55.5	11 5	269.3	5	8′ 12	....	......	573
4656	14 0 14.2	141 16 47	285.3	15	9 = 9	....	......	711
4657	14 0 18.0	164 57 4	80.7	18	7 10	....	......	782
4658	14 1 3.4	158 56 15	259.2	2	13 13	A * 10 m n p and one = 9 m in same meridian, more remote.	......	584
4659	14 1 4.0	144 40 9	115.8	12	7′ 11	....	B. 4793	436
4660	14 2 13.8	162 37 33	108.3	2	11 = 11	....	......	569
4661	14 2 17.0	118 5 38	49.0	2	10 = 10	Very neat..................................	......	451
4662	14 2 25.7	122 7 27	90.8	5	10 10+	....	......	701
4663	14 4 11.5	128 22 0	120.1	18	9 = 9	....	......	459
4664	14 4 41.8	118 26 48	18±	20	9′ 9″	....	......	451
4665	14 5 57.5	132 28 45	105.0	15	8 10′	....	......	457
4666	14 6 8.7	137 23 8	22.3	12	9 10	....	......	695
	10.7	22 54	25.8	10	9 11	....	......	463
4667	14 7 5.0	162 46 0	139.4	2	9 9′	Pos 134.7, 141.8, 139.3; half weight allowed to 134.7.	......	569
4668	14 7 52.6	123 4 7	274.2	4	10 12	....	......	572
4669	14 8 30.5	139 6 54	275.6	8	9 10	....	......	566
4670	14 8 40.6	115 25 5	26.6	12	9 12	....	......	453
4671	14 8 46.9	169 19 23	128.5	4	8 9	Pos 129.3, 127.7. Elegant *	L. 5864	593
4672	14 9 27.8	132 15 55	301.6	3	6 10′	Pos 301.7, 301.8, 301.3. L yell. S blue. [Lacaille's star differs 3′ in P D, probably some slip.]	L. 5887:	788
——	14 10 30.5	147 39 52	162.8	15	6 8′	Pos 163.2, 163.2, 161.8. Fine *	B. 4864	582
	33.6	40 29	{ 165.6 { 1.6	8 35	5′ 8 5′ 11	A B } A C } (y Centauri) triple, dreadfully ill defined	R. 19	
4673	14 11 12.9	141 37 32	148.8	7	10 11	....	......	711
4674	14 12 45.2	102 58 12	272±	18	9 9′	....	......	702
——	14 13 38.9	96 58 55	165.3	4	7′ = 7′	Fine double star............................	Σ. 1833	697
4675	14 14 9.8	144 1 35	342.1	5	10 10′	In the following part of a cluster	......	468
4676	14 15 26.1	148 51 44	261.5	12	8 8+	In cluster; very ill defined	......	713
——	14 15 33.7	100 53 53	320±	..	......	Suspected close double, but too ill defined for certainty. Pos estim from diagram. [N.B. There can be no doubt that this * is Σ. 1837, with 5′ misreading in P D.]	Σ. 1837	698
4677	14 15 36.3	138 16 11	158.3	7	10 11	....	......	465
4678	14 16 15.9	113 39 0	319.9	3	11′ 13	R A somewhat uncertain for want of zero stars	......	589
4679	14 16 22.2	111 20 55	313±	20	8 9	....	......	690
4680	14 17 25.9	164 52 1	359.7	8	9′ 12	....	......	569
4681	14 18 35.6	145 1 18	354.9	15	8 14	....	......	577
4682	14 19 12.3	131 45 0	347.6	12	8 14	The n f of two..............................	......	718
4683	14 21 22.3	151 31 25	63.6	15	9 = 9	....	......	578
4684	14 21 49.0	154 7 28	266.8	12	7′ 14	....	......	785
4685	14 23 45.5	135 24 27	75±	⅔	10 = 10	Seen elongated with the sweeping power (180). Tried 320, but the night would not bear it. After a long and troublesome examination, I succeeded in getting a sure elongation with a notched disc, with 240 and 12 inches aperture. Very delicate. Distance cannot exceed ½ or at most ⅔ of a second.	......	464
4686	14 24 44.1	126 15 49	87.0	8	9′ = 9′	....	......	447

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4687	14 25 13.3	125 48 23	83.5	1½	9′ 9′+	Very beautiful D ✱	......	446
	14.2	47 57	78.2	1½	9 = 9	Pos 78.6, 77.7, with 320 and 12 inches aperture. Beautifully divided, and well measured.	......	572
4688	14 25 41.4	153 31 59	68.6	3	10′ 11	......	......	785
4689	14 26 6.6	168 2 47	47.6	16	10 10	A group, 12 m, attached	......	593
4690	14 26 14.0	135 22 32	24.0	25	7 10	Yellow and blue, fine colours	B. 4974	463
4691	14 27 4.5	144 57 11	272.3	5	10 11	......	......	694
	6.2	57 28	267.7	12	9′ 10	......	......	577
——	14 28 5.4	150 7 25	214.8	20	1 2	*α Centauri.* Both yellow, nearly of the same colour. Pos 212.8, 214.8, 214.8, 212,3, 214.6.	A. 1653 + 1654	578
	5.7	7 44	215.0	..	......	Pos 215.6, 215.4, 214.1. The worst definition of the stars I think I have ever seen.	......	713
	6.1	6 17	214.8	20	1 1½	Pos 215.1, 214.5	......	596
	7.0	7 37	215.4	25	1 3✱	Pos 214.1, 217.3, 217.3, 213.8, 214.6. Definition beyond anything superb.	......	582
	7.4	7 39	216.3	..	......	Pos 216.6, 216.5, 215.9. Stars working. Definition curiously *hairy*.	......	715
——	14 28 52.1	154 13 37	243.3	18	3 8′	(*α Circini.*) L white, S yellow, superb ✱. Pos 242.1, 245.3, 242.4.	A. 1655	581
	52.4	13 49	245.3	20	4′ 9	Small star pale yellow. Pos 244.7, 246.0	Δ. 166	785
4692	14 29 40.3	131 55 21	298.5	10	9 9+	......	......	455
	41.4	56 10	300.1	6	9′ 9′	......	......	457
4693	14 30 34.0	162 45 12	204.4	18	10 10	......	......	569
——	14 30 38.8	144 26 47	204.5	5	9 = 9	Fine ✱	Δ. 168	694
	40.8	27 3	200.5	5	8′ 8′	Pos 200.7, 200.3. Fine ✱	......	577
——	14 33 —	144 53 —	......	..	6 7′	Class 5. Rev of B. "double" B	B. 5026	E
4694	14 33 25.7	114 16 30	45±	..	......	Strongly suspected to be close double extremely unequal, but no time to verify, and a S. Easter rising.	A. 1663	690
4695	14 33 49.4	164 13 15	292.1	15	7 11	......	L. 6044	606
4696	14 34 52.3	134 9 17	210.0	4	6 14	......	B. 5041	455
4697	14 34 57.6	159 49 10	139.2	15	8 9	Pos 138.8, 139.6, A 3rd ✱ = 14 m	B. 5040	598
	61.5	49 7	141.6	15	8 8′	......	......	597
4698	14 35 12.1	141 39 7	261.4	10	5′ 13	Delicate. Too much wind for a measure	B. 5044	711
——	14 36 10.8	114 42 38	136.8	7	6 7	Fine ✱. 54 Hydræ = III. 97	A. 1667	453
4699	14 36 26.2	148 41 14	126.7	35	7 10	Large ✱ orange	B. 5051	713
	38.0	41 34	127.4	40	6′ 10′	L orange, S greenish blue. [N.B. *Both observations rightly reduced. An error of* 10ˢ *in one or other chronometric reading must have been committed.*]	......	715
4700	14 37 7.5	100 22 23	222.4	25	9 9′	......	......	698
4701	14 37 43.2	126 4 12	87.5	5	10 10+	......	......	448
4702	14 38 2.1	125 7 21	212.7	10	9 11	Very neat star	B. 5062	446
4703	14 38 47.4	167 48 26	225±	10	8 12	Pos estimated from diagram	......	587
4704	14 38 59.9	151 58 48	276.3	5	9′ 11	......	......	596
4705	14 39 20.6	140 53 5	184.8	5	9′ 12	......	......	693
4706	14 39 54.4	136 41 54	217.4	7	8′ 10	Pos 218.5, 216.3. Both stars high yellow, almost orange.	B. 5073	695
4707	14 39 55.9	155 42 35	219.7	1½	7 8	Very fine ✱. Pos 222.4, 218.8	B. 5071	579
4708	14 41 29.5	94 45 55	330.6	12	10′ = 10′	......	......	608
4709	14 41 30.4	145 20 16	225.6	12	9 12	......	......	694
4710	14 41 39.0	131 22 34	265.3	12	9 9′	......	......	456
4711	14 41 44.7	124 19 13	330.0	8	9 12	......	......	448
——	14 42 5.8	135 8 32	225.6	18	8 11	L white, S dusky red	B. 5089	695
	6.5	9 39	223.5	15	8 11	......	Δ. 171	455

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4712	14 43 3.2	144 43 37	222.1	6	9 = 9	Pos 222.6, 221.7; fine	......	694
	4.3	43 48	223.7	6	8 8′	Pos 224.3, 223.1; fine *	......	577
4713	14 43 12.5	100 14 48	129.7	25	9′ 10	....	......	698
4714	14 44 12.1	152 51 40	147.6	20	8 9	....	......	785
	12.1	51 8	146.1	25	8′ 8′	....	......	581
	20.6	50 44	143.9	30	9 9′	There is reason to suspect the right ascensions of the last two hours of this *f*.	......	596
4715	14 45 2.1	137 11 9	275±	2	7 8	Fine star	B. 5112	464
	2.7	10 39	273.1	2	6′ 7	Very fine double star	......	695
4716	14 46 28.8	113 58 27	2.0	1½	9′ 11	Very neat star..................................	......	453
4717	14 46 37.7	128 37 40	215.1	18	9 10	....	......	573
4718	14 47 1.3	124 41 42	60±	1	9 11	Very delicate. Pos estimated, distinctly separated with 12 inches aperture and 180, but too late for a measure, the whole aperture having left some doubt, and time being in consequence lost.	B. 5123	446
	2.7	41 45	72.0	1½	9′ 11	Delicate. Query if it have not also some kind of nebulous or furry appendage. I remember fancying something of the kind in last night's observation of the same object.	......	447
4719	14 47 10.9	148 14 42	42.3	25	8′ = 8′	Pos 43.1, 41.9, 41.9. [N.B. This obs makes the minute of R A 48, but both the other observations agreeing in 47, that must be preferred.]	......	575
	13.8	14 46	37.7	20	9 9	....	......	582
	14.2	14 34	43.1	18	9′ = 9′	....	......	713
——	14 47 32.2	110 37 44	279.7	15	6 7′	L yellow, S more yellow; a curious coloured star, not a bad miniature of *α* Centauri (is H. 145.28 = Sh 190).	A. 1690	588
4720	14 48 15.7	95 10 57	......	10	10′ = 10′	....	......	608
——	14 48 56.3	111 41 55	92.3	12	9 10	....	h. 2757	690
4721	14 48 59.3	125 39 49	257.8	1½	11 = 11	....	......	448
4722	14 49 14.1	120 0 59	344.5	10	6′ 9	Pos 344.3, 344.7. Fine........................	B. 5141	794
	16.2	1 18	344.2	8	8 10	Pos 343.8, 344.5. Neat *	......	451
4723	14 49 58.3	141 13 42	171.0	6	7′ 12	The chief of a pretty bright group	B. 5145	711
	59.1	14 12	171.6	4	8 12	[B. 5144 does not exist]	......	468
4724	14 51 8.2	126 13 44	233.5	15	8 11	Wind violent	......	460
4725	14 51 35.8	134 50 36	350.9	12	9 11	....	......	455
4726	14 52 33.4	139 4 12	99.4	3	10 10′	....	......	467
	34.9	4 57	96.8	4	10′ = 10′	....	......	693
4727	14 53 25.5	117 9 19	36.2	5	9 = 9	Very fine double star	......	453
	26.9	9 43	37.3	8	9 = 9	Fine star	......	451
4728	14 53 33.7	136 23 5	109.8	⅔	5′ = 5′	(*π* Lupi). Suspected with 180, plainly seen double with 320 and the whole aperture, in spite of much flare, which rather assists the division.	B. 5166	695
4729	14 53 42.7	159 29 40	324.3	10	10 10	Pos 325.3, 323.3..............................	......	567
4730	14 54 24.9	126 33 28	316.5	12	8 11	Wind violent	......	460
4731	14 56 42.7	167 13 11	259.8	1½	9 11	The southern of 3	......	587
4732	14 56 55.8	137 39 4	72.8	9	9′ 10	....	......	463
4733	14 57 36.1	129 6 37	328.0	15	8 11	Wind violent	......	460
	38.7	7 35	323.3	15	8 12	....	......	573
4734	14 58 39.5	144 40 58	242.7	12	5 15	Pos 241.7, 243.8. Large star pale yellow. A most delicate and beautiful object. The small star one of the most minute companions to so large a one in the whole list of such objects.	B. 5193	577
	41.0	41 13	237.1	12	6 14	Pos 236.3, 237.8..............................	......	694
4735	14 59 14.7	149 44 46	27.8	3	7′ 12	....	......	575
	18.5	44 8	27.3	6	8 13	Elegant star	......	582
4736	14 59 20.8	114 23 21	166.8	6	11 = 11	....	......	453

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4737	14 59 31.5	165 39 7	270.3	6	9′ 10	A third star s f	......	587
4638	14 59 34.4	126 10 49	{ 160.0 { 24.8	15 12	9 11 9 12	} Triple. Nisi P D = 126° 4′ 19″. Wind furious. R Ascensions precarious in this *f*.	......	460
	43.8	12 5	{ 153.4 {	8 6	9′ 11 9′ 12	} [Nisi P D = 126° 5′ 45″. *The R A of this observation is to be preferred. The P D in one or the other observation requires a negative sign in the index reading, which has been inadvertently omitted, and no ground exists to decide which is right.*	......	447
4739	15 0 —	136 25 —	......	..	6 6	Class 5 or 6	......	E
——	15 0 7.6	141 25 57	247.6	80	4′ 6	(ζ *Lupi*)	A. 1717	711
	8.2	26 42	247.6	..	4′ 7	Δ R A = 6ˢ.5	Δ. 176	468
——	15 0 9.2	138 5 4	142.8	25	6 7	(κ *Lupi*)	B. 5201	693
	9.7	4 57	145.8	30	6 6′	Pos 145.4, 146.3..............................	+ 5205	467
	10.4	5 33	144.0	25	5′ 7	Pos 144.3, 144.2, 143.4..............................	Δ. 177	464
4740	15 0 10.2	117 48 48	30±	..	......	Excessively close (*if double*)..............................	......	451
4741	15 0 46.3	131 40 20	139.5±	3	10 11	....	......	457
4742	15 0 56.7	164 57 0	203.3	15	6 13	....	......	605
4743	15 1 29.0	122 11 15	199.6	15	8′ = 8′	Pos 199.3, 200.0..............................	......	794
4744	15 1 35.0	169 35 5	59.0	12	10 10′	....	......	593
4745	15 1 43.8	125 35 57	{ 164.4 { 100.0	12 8	9 10 10 12	A B } B C } Triple	......	446
——	15 2 6.8	94 56 26	......	30	10 10′	A third (? if ✱)..............................	Σ. 1914	608
4746	15 2 9.1	148 25 14	......	..	8′	A very composite or multiple star, consisting of a chief star 8′ m, and perhaps a dozen of 12, 13, 14 m, all within the distance of a sixth class double star. Ill defined.	......	713
	9.3	25 46	......	..	......	Curiously multiple. One of its companions is close double, pointing to the large star which is 8 m. The smaller stars are 12 or 13 m. Such multiple stars are rare. It is a close group, not above $1\frac{1}{2}'$ diam. In the diagram 10 companions are laid down.	......	582
4747	15 2 42.4	145 3 55	......	..	......	Double. No description	......	694
4748	15 2 54.4	130 48 8	11.4	15	9 9+	....	......	456
	56.3	48 20	6.7	18	9 9	....	......	718
	57.2	48 30	12.0	18	9 9′	Pos 14.0, 10.1..............................	......	457
4749	15 3 45.7	146 44 23	255.0	5	10 11	....	......	577
4750	15 4 7.1	137 25 44	23.2	12	7 12	[Right reduced, but B's R A differs 23ˢ]..........	B. 5238	463
4751	15 4 47.4	164 35 20	298.7	4	9′ 9′	Pos 298.3, 299.1..............................	......	569
4752	15 6 31.3	123 56 32	6.5	15	8′ 11	....	......	446
	33.5	56 52	9.8	15	8 11	....	......	448
——	15 6 45.4	137 15 15	136.5	20	6 7	Pos 136.7, 136.4; (μ Lupi.) $\mu^1 + \mu^2$ Lupi = Δ. 180.	A. 1728	463
4753	15 6 45.4	137 15 15	173.5	2.1	6 6	μ^1 Lupi. Close double. *Mean epoch*, 1836.221 ..	......	E
——	15 8 ±	97 36 ±	4.7	2	8 12	....	Σ. 1925	609
4754	15 8 31.0	147 21 30	306.7	3	11 12	....	......	582
4755	15 8 33.3	126 4 30	201.1	3	8′ 9	Fine star	......	446
4756	15 9 46.8	113 37 38	180±	$\frac{3}{4}$	9 9′	Requires verification	......	588
4757	15 9 53.3	148 41 30	110.1	$\frac{3}{4}$	5′ = 5′	(γ *Circini.*) Pos 109.8, 110.4. A momentary glimpse with 180 induced me to apply 320 with 12 inches aperture. It was then cleanly divided, and these are good measures.	B. 5283	575
	56.7	42 9	102.9	1	6 = 6	A beautiful object. Pos 104.4, 101.3. The first with 480, which separates the stars by $\frac{1}{3}$ diameter; the other with the same power and an aperture reduced to 6 inches.	......	717
4758	15 9 56.4	96 34 41	77.5	4	10 12	....	......	609
4759	15 10 33.9	169 36 40	48.4	25	8 11	Δ R A = 6ˢ.25	......	703

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4760	15 10 58.0	166 55 7	19.3	20	9 10	....	......	704
——	15 11 10.5	134 5 ±	173.3	40	4′ 10	(ε *Lupi*) = Δ. 182. Place by Catalogue in R A. Pos 173.2, 173.5.	A. 1739	455
4761	15 11 15.5	154 44 11	2.3	15	9 9+	....	......	581
	16.2	44 56	3.1	20	10=10	....	......	785
4762	15 11 40.6	169 36 34	45.0	20	9 10	Large star red..............................	......	593
4763	15 11 52.4	144 45 26	320.7	10	10 10	....	......	694
4764	15 13 0.0	163 47 14	248.8	25	6′ 12	The obs gives 163° N P D. B makes it 162° by 18 obs. I have misread 1°—if it be the same ✱.	B. 5302	569
4765	15 13 32.7	122 26 17	97.1	8	9′ 10	Both ruddy..................................	......	794
4766	15 14 53.0	132 15 27	128.5	15	9′ 10	....	......	454
4767	15 15 0.7	116 8 58	140.0	30	8′ 11	L red, S blue	......	453
4768	15 15 17.7	109 0 43	114.9	8	9′=9′	....	......	722
4769	15 15 29.4	111 18 48	191.1	12	8 9	Pos 191.7, 190.6...........................	......	588
4770	15 16 9.1	164 19 9	206.2	7	10=10	Very neat star..............................	......	569
4771	15 17 12.7	147 30 10	187.1	4	9′ 9′	Neat star...................................	......	582
4772	15 17 —	140 50 —	250.1	12.6	8 12	Mean epoch, 1837.094	......	E
4773	15 17 27.6	163 26 30	266.7	8	8 8	....	......	606
——	15 18 16.3	100 21 43	131.9	5	8 9	[Σ's P D for 1826 is 100° 17′]	Σ. 1939	698
4774	15 18 39.1	118 15 58	8.5	10	7 10	Pos 9.5, 7.5. Fine ✱	B. 5349	451
4775	15 18 55.6	109 18 5	4.0±	10	10=10	North of zenith, too late for measures	......	722
4776	15 19 3.0	131 19 37	226.5	6	6′ 9	L white, S yellow. Pos 225.4, 227.7	B. 5351	718
	4.8	20 50	224.0	3	7 10	Pos 224.5, 223.4...........................	......	457
4777	15 19 25.2	146 48 51	299.8	5	8 10	....	B. 5355	717
	25.8	49 3	297.2	4	8 9	Fine ✱. Pos 297.7, 296.8. N.B. This obs makes the minute of R A 18, which being a manifest mistake is corrected.	......	577
	25.8	49 16	299.7	6	8 9′	Pos 300.7, 298.8...........................	......	694
	28.2	48 11	291.8	4	8′ 11	Pos 292.0, 291.5. Neat star....................	......	469
4778	15 19 55.4	142 16 42	203.7	15	8 8+	....	......	711
4779	15 20 6.8	96 23 24	17.6	18	9 11′	....	......	608
4780	15 20 10.8	169 58 46	269.8	2½	9 9+	A very pretty double star	......	593
	11.9	58 25	271.3	3	9′ 9′	....	......	703
4781	15 20 47.0	132 21 25	196.4	12	9′ 10	....	......	455
4782	15 21 2.0	131 17 59	266.5	2½	11=11	....	......	456
4783	15 21 58.6	109 35 26	277±	12	6 9	Neat star. Position rude	......	722
4784	15 22 —	137 0 —	238.2	43:	7′ 10	Mean epoch, 1836.961	......	E
——	15 23 4.7	113 54 10	119.4	10	7 = 7	....	L. 6420	453
	5.6	54 23	123.1	12	7 = 7	Pos 122.5, 123.7. Very fine D ✱	S. 673	588
	6.7	55 2	121.1	20	8 = 8	....	......	793
4785	15 23 52.1	123 50 22	......	..	11=11	The preceding of 2 stars 2′ dist, very strongly suspected double.	......	446
4786	15 23 53.1	130 35 30	95.5	⅔	4′ 4′	(γ *Lupi.*) Pos 97.6, 94.3, 95.7. Cleanly divided with 480, and the black division well seen. Measures perfectly good, and to be depended on. With 800 well separated; with 180 and triangular aperture perceived to be double. [This shows the dist to be underrated at two-thirds of a second.]	AC. 1760	718
4787	15 24 12.1	169 4 10	316.4	15	9′ 10	....	......	703
	18.9	4 16	303.5	10	8′ 9	[*One or other of these positions must have been erroneously read off, or the micrometer displaced before reading.*]	......	593
4788	15 24 —	134 23 —	348.5	3.1	5 8′	Mean epoch, 1836.443. f Lupi	B. 5384	E

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4789	15 24 20.8	143 54 26	89.5	12	9 = 9	[*An error of* 1[m] *in R A corrected*]	......	469
	23.6	54 50	89.3	15	9′ 10	....	......	694
	23.6	55 51	88.3	15	10 11	....	......	599
	23.6	54 57	88.5	15	8′ 8′	Another 7′ mag to north	......	711
	26.8	56 2	90.0	12	9 = 9	Exactly in the parallel by the horizontal wire......	......	468
4790	15 26 56.7	168 10 30	349.0	18	8 11	Pos 348.3, 349.8	......	703
4791	15 28 18.3	137 47 52	117.2	10	10 10	....	......	463
4792	15 29 ±	161 53 52	110.0	6	7 8	R A not regularly taken on the wires	......	606
——	15 29 24.2	147 33 21	94.3	5	7′ 10	L very orange, S green	B. 5413 Δ. 190	717
——	15 29 28.8	98 13 24	6.9	5	7′ = 7′	....	Σ. 1962	609
4793	15 29 55.9	137 43 42	16.7	15	9 13	....	......	695
	57.7	43 32	20.5	15	9 11	....	......	463
4794	15 30 52.8	141 17 39	147.7	12	10 17	....	......	599
4795	15 31 10.4	148 34 18	222.1	10	8 11	....	L. 6472	717
	11.4	34 25	221.7	4	8 12	....	......	575
4796	15 31 —	148 9 —	116.6	34.4	8 8′	Mean epoch, 1836.683	......	E
4797	15 31 50.0	139 40 5	256.3	20	8 13	....	B. 5439	693
4798	15 32 0.9	173 43 14	138.6	18	8 12	....	L. 6404	594
4799	15 32 13.7	158 27 15	80.1	10	10 11	....	......	709
——	15 32 25.3	154 54 9	156.2	1½	7 = 7	Pos 155.6, 157.3, 155.7; the two last with 320. Fine star.	B. 5442	600
	29.3	54 8	158.1	1¾	7 = 7	Pos 159.3, 156.8. Very fine *	R. 20	580
	29.7	54 8	155.8	2	7′ 7′+	Pos 155.3, 156.3...............................	......	581
——	15 32 40.7	100 35 17	49.4	20	9 9′+	....	Σ. 1966	591
4800	15 32 42.1	135 13 42	190.4	5	10 = 10	Neat star..	......	464
	43.3	14 2	189.5	4	9′ = 9′	....	......	454
	44.3	13 32	190.5	4	9′ = 9′	Pos 190.2, 190.8.................................	......	455
4801	15 32 24.8	166 41 22	160±	12	9′ 10	Very ill defined	......	704
4802	15 35 51.4	132 2 22	287.9	1½	10 12	....	......	456
	54.1	3 31	282.7	3	10 12	....	......	718
4803	15 35 52.4	117 30 58	214.8	40	8 9	....	L. 6516	451
4804	15 36 43.4	98 49 17	......	20	8 = 8	....	......	609
	44.6	49 2	102.4	16	10 10	....	......	591
4805	15 37 —	142 41 —	135.2	33.0	6 11	Epoch, 1837.342	B. 5484	E
4806	15 37 3.6	144 14 0	321.7	12	9 12	....	......	696
4807	15 37 36.3	110 42 12	357.3	12	8 15	Small * extremely faint	......	722
——	15 37 54.6	144 32 0	16.0	25	7 10	Two more companions forming a curve	B. 5486 Δ. 193	696
	57.0	31 23	21.3	20	8 9	....	......	694
4808	15 38 41.6	133 53 11	58.3	2	11 = 11	....	......	455
4809	15 39 —	150 10 —	{ 50.9 { 257.0	43: 49:	7 9 7 9	A B } A C } Epoch, 1836.244..........................	......	E
4810	15 39 11.8	135 56 36	66.0	15	9 12	Pos 64.9, 67.0. L white, S red	......	463
	12.5	57 20	67.2	12	8′ 10	....	......	464
4811	15 39 31.2	131 53 9	64.5	3	10 = 10	....	.....	456
——	15 40 19.6	92 42 44	166.3	1½	9 9	Pos 165.4, 166.9, 168.1, 165.0..................	Σ. 1974	608
4812	15 40 37.7	127 35 48	76.4	4	10 = 10	....	......	461
	37.8	34 35	78.0	5	9′ 11	....	......	412
4813	15 41 21.6	149 39 39	97.0	2	6 11	Pos 97.8, 96.3, with 320 and 12 inches aperture. (*κ Circini*) a most delicate and beautiful object.	B. 5507	718
4814	15 41 29.2	126 11 1	328.3	8	9′ 11	Wind violent	......	460
——	15 41 37.6	160 35 30	313.7	35	8′ 9	Marked as double in B	B. 5508	567

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4815	15 42 18.0	124 23 24	140.3	15	9 12	....	......	791
——	15 42 21.8	139 49 28	10.3	10	8 9	Δ. 195	B. 5515	693
4816	15 42 54.7	173 38 5	323.6	15	8 12	Pos 322.1, 325.8, 323.2, 323.3	......	594
4817	15 43 5.8	135 29 28	{ 292.5 { 319.1	10 5	10 10+ 10+11	A B } B C } Triple	......	463
4818	15 43 6.8	135 30 28	298.5	5	11 11	The s f of two double st........................	......	463
4819	15 43 44.3	156 10 17	354.1	15	9 11	....	......	579
——	15 46 1.9	123 27 11	46.5	15	6′= 6′	Splendid D ∗. Pos 46.7, 46.3	B. 5535	592
	2.3	29 13	48.0	12	6′= 6′	Pos 48.3, 47.8. Superb. (ξ Lupi — Scorpii = Δ. 196.) [N.B. *This is not to be confounded with ξ Scorpii, Sh. No.* 216.]	+ 5536	791
4820	15 46 10.3	120 28 31	146.0	20	9 9+	....	......	794
4821	15 48 —	121 32 —	145.1	21.1	8 8	[*Nisi P D* = 122 32, in which case the star is B. 5550.] Mean epoch, 1836.887.	B.5550?	E
4822	15 47 20.0	128 39 30	91.0	5	10=10	....	......	462
4823	15 48 33.8	133 19 10	227.2	15	8 15	....	L. 6614	472
——	15 48 49.4	127 54 31	20.7	12	5′ 9	(*η Lupi*). Pos 20.7, 20.8. Wind violent	A. 1821	460
	51.9	54 21	23.4	15	5 9	Pos 24.2, 22.4, 23.5. S blue. *Perhaps* Δ. 197....	R. 21	461
——	15 49 16.8	109 26 21	320.3	20	8 8	Pos precarious. No time	σ. 498	722
4824	15 49 40.5	135 47 0	240.5	4	9′ 11	....	......	463
4825	15 50 ±	147 17 ±	251.2	15	6′ 9	Pos 250.3, 252.1	B. 5559	582
4826	15 51 30.0	119 13 33	78.1	2	10=10	Neat star	......	451
4827	15 52 14.8	133 56 4	170.0	15	9 11	P D not good	......	455
	15.1	54 47	173.0	15	10=10	[Is one of these stars variable ?]	......	454
4828	15 52 52.3	132 50 50	90.7	3	9 12	....	......	472
4829	15 52 53.0	149 39 13	359.1	12	8′ 10	L very red, S white	......	717
——	15 35 1.7	100 54 20	80.5	5	5 9	(*ξ Libræ.*) Superb D star	Σ. 1998	591
——	15 55 5.1	100 58 35	100±	10	8 8	Near ξ Libræ. Neat ∗	Σ. 1999	591
——	15 55 17.7	168 14 5	12.7	90±	5 6	A third = 14 m, following forms a triangle (δ Apodis).	B. 5584 + 5586	587
——	15 55 33.8	109 19 38	25.6	18	3′ 4	Pos 26.5, 24.7. (*β Scorpii.*)	A. 1836	722
	34.9	20 3	29.5	18	3 5	....	σ. 506	601
4830	15 56 : —	132 32 :—	232.7	21.2	9 10	Epoch, 1834.348	......	E
4831	15 56 9.3	126 17 43	356.6	40	6 13	The middle of 3	B. 5598	461
	9.7	17 6	360.0	40	6 12	Wind violent. (? position.)	......	460
	....	....	359.2	40	5′ 11′	....	......	462
4832	15 56 29.7	123 23 1	{ 342.6 { 17.7	15 15	10 11 10 11	A B } A C }	......	791
——	15 56 39.1	95 49 33	{ 230.5 { 185.0	20 35	7 12 7 12	A B } A C } [*The large ∗ not noticed as close double.*] ..	Σ. 2005	608
	40.8	49 5	......	20	7 12	....	......	609
4833	15 57 9.0	135 51 50	142.0	3	10=10	Pos 141.3, 140.7. Neat ∗	......	463
——	15 58 42.4	122 11 13	86.3	15	7 7+	Fine star. (*Noticed as D by B.*)	B. 5613	794
4834	15 59 19.9	117 39 38	20±	20	9 = 9	....	......	451
4835	15 59 58.2	143 46 31	85.3	10	9′= 9′	Chief ∗ in middle of a superb cluster	......	469
	59.8	47 4	85.9	12	9 = 9	Chief of a cluster	......	468
	....	45 30	85.7	7	10=10	No R A, and P D bad	......	694
4836	16 0 23.3	124 24 29	296.6	3½	8 9	Neat star	......	791
4837	16 0 33.6	133 12 10	80.0	8	9′= 9′	....	......	472
	33.7	11 42	79.0	6	9′= 9′	Neat ∗	......	454
	36.7	11 40	75.6	6	9 = 9	Pos 76.0, 75.4, 75.5	......	455
——	16 0 49.4	97 47 27	256.7	20	8′ 11	[Obs gives 96° P D, but ʃ 609 agreeing with Σ, makes it 97.]	Σ. 2012	697
	49.9	48 6	254.6	30	5′ 17	[A mistaken wire, proved by the re-examination of both observations, corrected.]	......	609

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4838	16 1 38.4	139 37 49	136.1	20	9 10	....	......	465
4839	16 1 47.0	117 57 33	84.5	3	7′ 10	(12 Scorpii)........	A. 1849	451
—	16 2 36.7	109 0 29	336.6	60	5 6	*ν Scorpii* = *σ*. 509........	A. 1851	722
—	16 4 37.9	97 11 37	0±	20	8 9	....	Σ. 2018	697
—	16 4 57.1	99 58 34	......	18	8 11	....	Σ. 2019	590
	58.0	58 43	152.6	20	8 11	....	......	591
4840	16 6 23.8	124 23 21	293.3	4	9 9′	Pos 292.7, 293.9. Elegant *	......	592
4841	16 7 11.1	139 44 5	348.5	25	6 12	(γ^2 *Normæ*)	A. 1862	465
4842	16 7 28.9	136 47 25	200.8	20	9 11	....	......	463
—	16 8 49.4	120 29 18	324.3	35	6′ 7	Pos 322.9, 325.7. [*Marked as double in B.*]	B. 5685	794
	50.7	29 18	321±	20	7′ 8	....	A. 1866	451
4843	16 10 29.1	122 54 36	270.6	15	7 13	The preceding of 2........	L. 6796	791
—	16 10 32.1	133 29 32	196.3	40	5 9	Δ. 200........	B. 5699	455
—	16 10 34.7	109 41 51	22.6	15	7′ 8	....	σ. 515	722
	35.5	41 28	23.1	15	8 8′	....	......	601
—	16 10 51.9	115 9 42	274.3	15	4′ 9	(*σ Scorpii.*) Pos 275.4, 273.2........	A. 1872 IV. 21	474
	52.8	10 21	273.4	15	3 11	A superb double *. [N.B. *Much over and underrated.*]	Sh. 224	453
4844	16 11 8.7	149 1 43	69.3	4	10 10′	....	......	717
4845	16 12 3.4	130 49 45	140.5	1	7 7′	Suspected, with full aperture; 6 inches equilateral triangle has too little light; cleanly divided with 320 and 12 inches aperture.	B. 5708	456
4846	16 12 6.2	137 49 45	155.8	12	9′ 10	....	......	695
	6.9	48 42	156.2	12	9′= 9′	Both ruddy. Pos 157.3, 155.2........	......	463
4847	16 12 13.5	120 39 24	222.1	6	10=10	Very neat star........	......	478
—	16 12 14.2	153 39 25	24.2	15	7′ 12	*ι* Trianguli Australis = Δ. 201	B. 5709	600
	17.0	38 33	20.6	35	7 9′	....	......	580
4848	16 12 58.9	122 47 25	155.0	6	7 7	Very ill defined	L. 6815	702
	61.2	47 21	158.6	6	7′= 7′	Pos 158.7, 158.5. Very fine *	......	592
	61.6	49 45	157.2	8	7 7′	Neat *. ? P D, the *f* being over the zenith......	......	791
	61.9	48 0	155.3	5	·7′ 8	Pos 156.1, 154.5 (144.5 in MS.)	......	794
4849	16 13 44.2	155 39 35	150.7	20	8 11	A third star near........	......	579
	44.4	39 2	150.4	15	10 11	....	......	709
4850	16 14 0.0	119 17 53	352.1	4	7 7′	Very fine *. Pos 352.4, 351.8	M. 7607	451
4851	16 14 8.8	112 37 33	96.9	15	8 11	....	......	788
4852	16 14 32.6	127 29 44	115.8	6	10 11	Wind violent	......	460
4853	16 14 44.8	137 9 40	336.8	25	5 7	Pos 336.2, 337.5. (*ε Normæ*)........	B. 5723	463
	46.0	9 54	336.3	25	5 9	....	......	695
4854	16 15 —	147 21 —	n f	..	6	Class 1. "Very difficult"—"to be verified."	B. 5726	E
—	16 15 23.5	113 3 4	0±	6	7 = 7	(5, g *Ophiuchi.*) No other star but its 2 companions, on an intensely black ground.	A. 1877 Sh. 228	793
	25.9	2 45	2.1	2	7′ 7′	In a great blank space. Has 2 stars 8 m near	II. 19	588
4855	16 17 38.5	157 47 0	299.3	4	10 10′	....	......	579
4856	16 18 36.6	142 13 27	240.7	3	10 11	In a superb part of milky way	......	468
4857	16 18 43.1	136 5 27	73.1	5	8′ 10	L white, S red. Pos 72.4, 73.9	......	463
4858	16 19 4.0	167 8 1	104.8	20	5 14	(*β Apodis.*) Difficult. Large * single and well defined.	A. 1886	587
4859	16 20 13.2	117 56 53	274.5	12	10=10	....	......	451
4860	16 20 22.4	169 18 45	230±	8	8 12	Too ill defined for measure	......	705
	25.5	19 4	235.1	15	9′ 12	....	......	573
4861	16 21 18.7	137 44 39	5±	10	6 10	[*Pos dist, and mag merely estimated from the diagram.*]	L. 6860	463
4862	16 22 15.3	151 10 28	180.7	10	9′ 9′	....	......	596
4863	16 23 51.8	143 24 56	124.1	4	9′ 10	....	......	468

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4864	16 24 9.6	96 12 50	......	..	9′ 13 14	Triple classes I. and II.	......	608
4865	16 24 18.3	173 41 23	314.4	2	9 11	Pos 311.7, 316.8, 314.7. Ill defined	......	594
4866	16 25 39.9	146 38 12	130.5	3	7 7+	Beautiful ✱. Pos 131.7, 129.3	B. 5770	717
	40.8	38 57	125.9	3	9 = 9	Pos 126.1, 127.2, with 320 and the whole aperture; 124.4 with 800 and 15 inches; tried 1200, but could not illuminate the field sufficiently for a measure.	......	469
	41.0	38 26	129.2	3	7 7′	Pos 128.7, 130.7, 128.3	......	712
	41.2	38 45	127.1	3	8′ = 8′	Beautiful ✱. Pos 125.5, 128.7	......	696
4867	16 26 23.5	133 2 5	295.5	12	7 10	Pos 297.8, 294.2, 294.5	B. 5777	472
	25.8	2 17	294.8	12	7′ 11	Pos 295.6, 294.0	......	
4868	16 26 53.4	139 59 19	77.9	20	9 9	Haze increasing	......	465
4869	16 26 54.1	120 35 34	60.3	..	......	......	......	478
	54.4	36 18	59.3	10	9 9	......	......	794
4870	16 27 46.2	126 51 31	10.2	30	6′ 12	Wind violent	B. 5783	460
4871	16 27 —	137 26 —	47.1	27.6	7 10	Mean epoch, 1836.864	B. 5781	E
4872	16 27 49.1	117 27 58	265.5	8	10 11	The preceding of 2 double st	......	451
4873	16 27 —	139 1 —	72.1	31.8	8 8′	Mean epoch, 1836.719	......	E
4874	16 27 55.3	150 35 47	298.8	2	10 10′	......	......	480
4875	16 27 56.6	117 24 58	275±	8	10 11	The following of 2 double st	......	451
——	16 28 3.3	114 52 51	67.9	13	9′ 10	Pos 66.7, 69.0	h. 1292	453
4876	16 28 37.8	138 25 19	265.9 164.9 14.3	10 12 15	7′ 8 13 14	A B. Pos 266.1, 265.8 A C. Quadruple A D.	B. 5792	693
4877	16 29 31.3	138 12 35	90.0	10	9 11	......	......	465
4878	16 29 37.8	117 39 13	1.3	10	9′ = 9′	......	......	723
4879	16 29 38.4	107 24 0	339.9	20	10 = 10	A 3rd ✱ 11 m near. Pos 95 ± by diagram	......	699
4880	16 30 —	136 3 —	151.0	31.9	8 11	Epoch, 1837.348	......	E
4881	16 31 37.7	137 8 13	258.5	5	9′ 11	In a cluster	......	463
4882	16 31 57.4	138 40 8	173.4	12	10 10	......	......	465
4883	16 32 38.2	132 3 46	183.4	..	......	......	......	479
4884	16 34 37.4	172 2 42	7.7	30	8 10	......	......	594
4885	16 34 52.2	138 0 0	196.5	30	8 = 8	C A. Place of the ✱ C. A ✱ 7 m also precedes 8s.0 somewhat north.	B. 5825	465
	56.3	1 41	245.3	4	9′ 10	A B. Place of the star A. [N.B. *The small star 10 m was not noticed in* ∫ 465.]	......	467
4886	16 35 22.0	93 46 57	94±	3	12 12′	......	......	608
——	16 36 50.2	126 34 17	149.8	25	9 9+	Δ. 209	B. 5841	462
4887	16 37 36.6	118 25 13	90.0	18	9′ 9′+	......	......	451
4888	16 39 4.1	109 17 21	310.8	7	10 = 10	......	......	722
4889	16 39 32.3	127 12 28	9.0::	4	6 9	Fine ✱. Place bad. Lamps going out; wind violent.	L. 6999	460
	34.2	11 47	5.2	4	7 9	Pos 5.0, 5.4	......	461
4890	16 41 25.0	136 37 13	329.3	30	8 9	In a vacancy of the milky way, which is here entirely free of ground stars.	......	463
	26.9	37 52	327.3	25	8 8+	......	......	464
4891	16 42 3.3	114 23 44	129.1	5	10 = 10	......	......	453
4892	16 42 8.6	131 30 26	297.7	5	8 11	Chief of a fine cluster	B. 5874	479
4393	16 43 —	131 33 —	......	..	......	Class 2. In the cluster with No. 4892	......	E
4894	16 43 13.7	152 55 22	119.5	2	13 = 13	Distance by oblique transits = 5″.50	......	600
4895	16 43 17.4	118 38 28	95±	15	9′ 12	......	......	451
4896	16 43 43.2	136 34 18	24.8	2	8 9	Fine ✱. Pos 24.2, 25.5	......	464
4897	16 45 11.1	148 54 2	22.1	20	8 11	......	......	582
4898	16 45 17.1	116 22 47	125.0	7	9 12	......	......	453

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4899	16 45 28.8	135 38 56	270.0	1	9′ 10	Chief of the central group of a cluster	......	463
	30.2	39 40	261±	1	10 11	Chief of central mass of cluster..................	......	464
4900	16 46 8.4	149 2 55	22.9	20	7′ 12	[R A 1m too great by Lacaille]..................	L. 7036	712
4901	16 46 24.1	148 35 4	134.3	2	8 = 8	Has a large ⁎ s f. [N.B. The obs gives the degree of P D 149, but this is contradicted by the obs of *ƒ* 712, which gives 148, making the place precisely that of B. 5907.	B. 5907	717
	25.8	34 37	133.1	3	8 = 8	....	......	712
——	16 47 5.0	109 15 53	229.6	5	6′ 8	Fine star (= σ. 534). Pos 231.0, 228.3..........	A C. 1937	722
4902	16 47 16.1	117 19 33	31.8	12	8 11	....	......	453
	31.5	19 29	38±	15	8 12	*Measure* hurried (north of zenith, therefore no time). [N.B. *If the discordance of R A between these obs arises, as is probable, from the moveable wire having been mistaken for the fixed, this observation is that which must be rejected.*]	......	723
4903	16 47 19.8	119 54 58	88.5	15	9 12	....	......	451
4904	16 47 40.5	165 6 57	183.2	3	8 10	Neat star..................................	L. 7028	587
4905	16 48 38.5	144 48 34	65.4	20	8′ 11	Pos 64.5, 66.3. Large star intense ruby red, S fine contrasted blue.	......	469
	....	47 ±	67.8	30	9 10	Pos 67.4, 68.3. L ruby red....................	......	696
4906	16 49 28.3	138 38 58	232.4	10	8 12	....	......	467
4907	16 49 39.6	113 56 41	49.1	15	8 8′	....	......	793
4908	16 50 21.0	129 28 10	179.9	1½	10=10	A neat star in the following angle of a condensed group in a cluster.	......	456
4909	16 51 —	140 50 —	284.4	17.1	8 8′	Mean epoch, 1836.516	B. 5931	E
4910	16 51 3.8	125 27 19	265.7	5	11=11	....	......	791
4911	16 51 13.2	110 9 59	0	..	......	? if not a very small companion to north..........	......	722
4912	16 51 21.1	172 35 4	123.7	25	7 13	Pos 124.3, 123.1............................	B. 5928	594
4913	16 52 25.4	136 59 33	243.6	3	9 11	Pos 244.8, 242.5............................	......	463
4914	16 52 49.0	162 28 16	259.3	1½	9 9	Pos 258.8, 259.8. [The R A may be wrong several seconds.] The s f of two.	......	605
	55.7	28 9	262.9	1½	9′ 9′	Pos 264.8, 263.3, 260.5. Dist by oblique transits = 3″.43.	......	606
4915	16 53 14.3	127 38 12	339.0	6	9 11	In the n f corner of a cluster....................	......	461
4916	16 55 31.3	139 13 36	276.4	7	9′= 9′	Neat star..................................	......	466
4917	16 55 54.5	144 6 28	331.1	7	8 12	Stars growing ill defined	......	469
	57.7	5 48	324.4	9	8 12	Pos 323.5, 325.3............................	......	696
——	16 55 55.3	156 58 23	328.4	35	7′ 10	L yell, S blue. Δ. 214. Dist by oblique transits = 28″.58.	L. 7107	612
4918	16 56 34.6	132 27 18	283.8	8	9 11	....	......	455
——	16 56 52.2	103 41 32	16.7	2	8 = 8	Pos 16.7, 17.9, 15.5, 17.6. It is not *so very* close; 180 with the full aperture to-night shows it very well. The 3 first measures taken with 320, which separates the stars by one full diameter. When the 6-inch equilateral triangle is put on, it seems to shrink up, and in that state it does look so very minute as to account completely for the illusory distance of half a second in the last sweep.	Σ. 2119	720
	53.5	41 30	10±	½	8 = 8	[*Pos estimated from diagram.*] I think this is the closest double star I have seen. No time for a measure (being north of zenith), and the triangle not having been applied till past the middle of the field. Discs perfect points.	......	719
4919	16 57 7.0	118 19 48	267±	18	9′ 10	....	......	451
——	16 57 44.5	136 30 36	168.4	5	8 9	Fine. Pos 168.3, 168.5; Δ. 213. Marked double in B.	B. 5968	464
4920	16 58 19.1	148 22 2	329.3	3½	8 11	Pos 326.8, 330.6, 330.5........................	B. 5973	712
4921	16 58 30.0	121 27 10	139±	4	9′ 10	....	......	478
4922	16 58 31.6	109 58 51	314±	25	7′ 11	....	......	722

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4923	16 59 9.4	108 2 30	184±	3	8 9	....	......	698
4924	17 0 7.2	159 0 40	99.8	12	10′ 12	....	......	709
4925	17 1 3.7	152 36 49	138.4	20	13=13	A double star taken by reason of its remarkable situation in a nebula.	......	600
4926	17 2 39.9	129 37 39	330.8 212.0	10 12	7 12 7 13	Triple. Large * high orange. [*Probably some accidental slip of the telescope before reading off* P D.]	L. 7171	456
	41.7	33 15	332.7 210.4	15 18	7 11 7 12	Large star orange	......	718
	42.7	33 26	337.1 211.7	8 12	8 11 8 11	Triple. L very red. [N.B. Lacaille gives P D = 129° 33′.]	......	461
——	17 3 48.0	93 50 34	99±	1¼	8′ 10	Ill defined with 320. Also a hurried measure, as (being north of zenith) the star cannot be followed beyond the meridian.	Σ. 2132	608
4927	17 4 34.8	140 55 29	142.8	4	10 11	....	......	598
4928	17 4 45.5	128 26 45	299.8	12	9′ 10	....	......	462
——	17 4 50.8	116 20 34	41.3	6	6 = 6	A late and hurried measure gave 46.0 for pos (36 *Ophiuchi.*)	A. 1967 Sh. 243	453
4929	17 5 33.7	135 53 20	226.3	10	9 11	....	......	463
	34.3	53 22	224.7	10	9 11	Pos 224.5, 225.0..............................	......	464
4930	17 5 36.6	144 9 42	44.7	10	9′ 11	....	......	696
4931	17 5 40.9	149 14 51	260.5	¾	8 = 8	Pos 259.5, 261.5. Excellently separated and measured with 320 and the full aperture. [*The distance therefore probably not less than* 1″.]	B. 6016	712
4932	17 5 45.7	107 57 54	228.8	12	9 12	....	......	722
	45.9	59 25	226.3	8	9 10	....	......	699
4933	17 5 56.2	165 40 32	236.8	..	9 12	Δ R A = 5ˢ.0.....................................	......	706
——	17 7 3.7	116 25 46	334.5	6	8 11	(38 *Ophiuchi.*) A late and hurried measure gave pos = 339.5. No other double star near 36 Ophiuchi.	L. 7220 I. 35	453
4934	17 7 17.9	148 50 42	88.1	10	10 11	....	......	582
4935	17 7 25.4	124 47 2	130±	..	......	Pos estimated from diagram	B. 6027	792
4936	17 7 30.2	135 59 40	81.8	8	9 9′	....	......	463
4937	17 7 30.8	167 57 55	228.7	30	8′ 13	....	......	611
——	17 7 41.1	114 5 44	358.3	15	5″ 6	Superb double star. III. 25 = Sh. 245	L. 7224	793
4938	17 8 —	146 16 —	108.4	24.6	8′ 8′	Mean epoch, 1835.895	......	E
——	17 9 42.4	96 14 35	23.7	10	9 9+	Pos 23.1, 23.8, 24.3	Σ. 2149	608
4939	17 9 —	146 17 —	224.4	30.8	8 9′	Mean epoch, 1835.895	......	E
4940	17 9 52.3	121 38 30	94.1	2	10 11′	....	......	478
4941	17 10 25.6	141 43 47	139.3	3	11=11	....	......	468
4942	17 11 6.4	146 12 20	327.2	12	3 12	(γ *Aræ.*) Pos 328.3, 326.2. A 3rd * 13 m, 20....30″ dist. Pos 50 ± by diagram.	A. 1983	469
	....	....	321.2 64.6	25 50	4 12 4 12	A B Pos A B = 320.7, 321.8. Tried 328.3. It A C will never do for a measure.	......	696
4943	17 11 40.7	155 59 9	243.2	2	11 11′	An elegant little double star	......	709
4944	17 11 51.7	136 58 27	170.6	15	9=9	....	......	463
4945	17 12 38.4	137 44 25	112.1	4	9 10	....	......	464
4946	17 13 29.2	124 2 54	109.1	12	10′ 11	Close to a large nebula	......	792
4947	17 13 35.3	171 46 44	75.3	12	8′ 8′	Pos 74.5, 76.5, 74.8. Both yellow	......	594
4948	17 14 8.7	112 38 22	103.8	18	8 11	....	......	793
4949	17 14 18.7	135 40 42	269.2	2	6′ 7	Pos 268.5, 270.0. Fine *	B. 6072	463
	....	40 ±	266.8	2	7′ 8′	Viewed..	......	464
4950	17 15 30.7	147 23 51	310.7	10	10′ 11	....	......	712
4951	17 15 47.8	150 31 33	303.6	40	6 12	(δ *Aræ*)	B. 6081	716

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4952	17 15 52.6	148 45 52	......	..	......	Place the centre of a field in which are 7 or 8 double stars, all about 10″ distance, and 12 and 13 m; and all, especially those in the central group, having an approximate general parallelism of direction.	......	582
4953	17 16 23.1	109 20 43	176.5	18	8′ 9	....	......	722
——	17 16 41.4	133 49 9	169.9	15	7′ 9	Pos 169.5, 170.4. Fine ⁎. Δ. 217	B. 6085	455
4954	17 18 28.5	161 59 52	284.2	15	8′ 12	....	......	597
	37.6	59 41	293.1	15	8 12	Obs makes the minute of R A 19 instead of 18. The earlier preferred.	......	606
4955	17 18 42.3	139 43 56	178.5	60	4 13	(*a Aræ*)	A. 2001	465
4956	17 19 37.6	152 48 56	167.3	2	11=11	Dist by oblique transits = 2″.23	......	600
4957	17 19 43.5	136 29 30	93.0	1¾	10=10	12 inches aperture	......	464
4958	17 20 9.1	130 28 16	59.0	12	10=10	....	......	456
4959	17 22 2.6	144 30 0	118.5	12	9 = 9	n p is a remarkable group of stars 12 m	......	469
4960	17 23 3.2	98 22 6	90.3	3	9′= 9′	....	......	609
4961	17 23 19.0	149 48 19	153.9	15	10=10	....	......	716
	19.8	48 13	156.1	15	10 10	....	......	480
4962	17 23 36.6	122 27 50	95.5	2	6′ 13	Besides this there are at least 15 or 20 more st, 13 m, clustering close round the L star. Very curious.	B. 6125	478
	37.1	27 15	102.3	8	6 13	Chief of a cluster	......	794
4963	17 24 35.3	131 48 21	325.6	8	8 11	L orange, S yellow..............................	......	456
4964	17 25 17.6	101 7 22	233.8	80	6′ 8	....	......	591
4965	17 25 48.5	141 4 58	233.8	12	9 9′	....	......	468
	50.6	4 26	225.8	15	8 8′	....	......	789
	53.3	5 25	227.4	8	9 9′	A third near	......	465
——	17 26 —	95 46 —	{ 162.7 { 10.9	20 25	7′ 12 10	A B } Triple A C }	Σ. 2183	608
4966	17 26 55.1	124 53 31	276.3	12	9 = 9	The chief of a cluster.........................	......	791
4967	17 27 —	143 32 —	43.8	1½	11 12	At the n f border of a cluster	......	468
4668	17 27 —	143 34 —	11.5	2	13=13	In the s f part of the same cluster...............	......	696
4669	17 27 52.9	143 55 8	52.5	18	9′ 10	....	......	696
4670	17 29 11.2	138 32 59	73.5	4	9 10	A third precedes	......	465
——	17 32 25.2	112 16 11	11.0	15	8 9	....	h. 591	793
4971	17 32 34.3	145 56 6	193.2	3	10 11	....	......	469
4972	17 33 2.6	160 10 2	270.3	5	10 11	....	......	597
4973	17 33 29.7	135 6 2	29.5	15	8 9	....	......	464
4974	17 33 38.6	166 7 8	115.1	20	7 15	Dist by 2 oblique transits = 29″.72..............	B. 6185	607
4975	17 34 —	145 20 —	98.5	1.5	6′ 10	Mean epoch, 1836.510. [*Probably a binary star in a rapid state of angular change.*]	B. 6193	
4976	17 36 30.3	160 27 59	44.5	20	9′ 12	....	......	598
4977	17 36 38.0	93 25 27	139±	25	7 14	....	......	608
4978	17 36 39.3	143 32 3	267.0	15	6 11′	(*ν′ Aræ.*) Fine object	B. 6204	789
4979	17 36 43.8	150 19 19	239.8	12	8 12	Pos 241.3, 238.7, 239.3..........................	L. 7421 ?	480
	44.1	19 23	240.8	8	7 11	[If this be Lacaille's star, his P D must be 3′ wrong.]	......	716
——	17 36 46.7	103 13 40	203.9	18	8′= 8′	....	Σ. 2204	617
	46.9	13 41	205.0	20	9 9	Pos 205.6, 203.6................................	......	719
4980	17 37 57.5	155 9 58	139.3	6	9′ 13	Dist by oblique transits = 6″.21	......	600
4981	17 37 58.6	140 13 25	203.6	1½	10=10	Neat star. Pos 204.6, 202.7. The latter a delicate measure with 320.	......	466
4982	17 38 —	138 13 —	59.8	43.1	7′ 9′	Mean epoch, 1837.405	B. 6210	E
4983	17 38 38.4	156 28 53	15.1	25	9 9′	....	......	612
4984	17 39 3.7	142 25 29	5.9	15	8′ 10	....	......	468

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
4985	17 39 19.5	152 56 34	268.8	18	9 10	......	......	716
4986	17 39 42.9	116 16 35	330±	12	8 12	One or two more companions	......	453
4987	17 40 37.2	170 26 29	133.2	5	10′ 13	......	......	611
4988	17 41 58.1	168 57 41	302.3	6	9′=9′	Pos 302.3, 302.3. Dist by obl trans = 9″.22......	......	611
	66.5	57 34	304.1	12	9 10	......	......	593
4989	17 42 29.9	135 7 12	26.4	12	9 10	......	......	455
4990	17 42 41.1	112 17 46	......	..	......	Course double star. Chief of a cluster	......	793
4991	17 42 46.2	116 36 22	179.0	18	9′=9′	......	......	453
4992	17 42 50.1	147 37 19	2.1	3	9 10	Pos 1.2, 3.0......	......	582
	53.2	37 9	3.8	7	8 8+	......	......	712
4993	17 43 16.7	103 17 5	305.9	15	9′ 10	......	......	617
4994	17 43 40.0	142 9 4	209.3	18	8′ 9	......	......	789
	40.7	10 2	211.7	12	9 9′	......	......	468
4995	17 44 38.6	101 17 52	140±	18	6′ 12	A third closer suspected; [*Pos estimated from diagram.*]	......	721
4996	17 44 42.6	152 9 41	262.8	3	9 13	Ill defined. [*This position must be rejected*]	......	481
	48.1	7 48	245.8	3	9′ 11	Well defined. A neat star......	......	716
4997	17 46 7.4	101 53 45	265.7	12	10=10	......	......	617
——	17 46 32.8	105 46 5	157.1	25	7 9	Pos 156.5, 156.3, 158.6 (h. 2814)......	A. 2050	699
4998	17 47 0.8	146 55 14	293.3	..	......	By diagram, very unequal......	......	696
4999	17 47 29.8	165 11 28	176.0	15	8 10	Pos 176.5, 175.6; } Dist by oblique transit = 13″.04	L. 7474	605
	33.8	11 17	172.7	..	8 8′	Pos 172.5, 172.9; }	......	607
5000	17 47 39.0	126 54 39	117.4	6	8′ 11	......	B. 6267	461
5001	17 47 51.0	162 19 49	297.7	10	9 13	......	......	606
5002	17 47 51.5	113 57 5	39.5	3	11=11	......	......	453
5003	17 48 12.7	120 13 15	104±	6	7 8	Both stars high yellow	M. 8300	794
5004	17 49 12.4	132 2 55	307.1	15	9 10	......	......	456
5005	17 49 —	135 48 —	28.2	26.7	7′ 9	Mean epoch, 1836.427	B. 6273	E
5006	17 49 45.8	149 11 43	333.7	30	6 13	Another star 6′ m n p. Single......	B. 6280	712
5007	17 51 44.9	127 14 25	220.4	8	9 10	......	......	461
——	17 52 6.6	113 1 32	21.1 211.3	5 15	7 11 7 8	A B } The triple star H. 145.40 in the trifid nebula A C } H. IV. 41.	Sh. 379	588
5008	17 53 42.8	156 24 8	235.4	12	9 12	......	......	612
	46.2	24 32	239.6	15	10 14	......	......	709
5009	17 53 49.5	114 14 15	20.8	2	10 12	The star γ in the monograph of M. 8. Place by micrometric measures from 9 Sagitarii. Pos measured, Sept. 5, 1837.	......	
——	17 53 50±	98 10 6	......	..	......	Violently suspected double, and indeed set down as a tolerably decided observation, after very long examination with 320 and a triangular aperture. But a re-examination the next night, July 20, 1835, with a newly polished mirror in excellent action, with powers 180, 320, 480, and 800, the latter defining it well, left me satisfied that the supposed companion was a mere illusion. To me, therefore, the star is single. However, the star was tremulous and restless.	Σ. 2262	608
5010	17 54 14.4	114 19 11	......	..	......	A double * following the nebula M. 8, in cluster VI. 13.	......	453
	16.4	20 46	350.3	4	10=10	The star G in the monograph of M. 8. Place determined by micrometrical measures from 9 Sagittarii. Pos taken, Sept. 5, 1837.	......	
	17.1	20 34	352.2	2	12=12	In cluster VI. 13	......	474
5011	17 54 20.7	131 44 45	355.0	30	8′ 10	......	......	455
5012	17 54 28.9	124 56 31	194.1	25	8′ 9	Both yellow......	......	592
5013	17 54 46.7	105 3 15	339±	4	9 13	Too late for measure	......	617
5014	17 55 —	133 24 —	69.2	0.7	6′ 6′	Mean epoch, 1836.734	B. 6308	E

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5015	17 55 54.5	135 46 11	262.6	3	6 11	A most beautiful and delicate object. Pos 263.0, 262.3.	B. 6310	725
——	17 56 39.2	107 12 5	140.3	12	9 11	....	h. 2818	699
5016	17 56 42.4	94 32 57	89.3	5	10 11	....	......	608
5017	17 56 50.7	138 52 43	320.4	15	9 10	....	......	465
5018	17 57 2.5	149 51 56	258.9	8	10 11	....	......	716
5019	17 57 14.5	156 50 8	332.5	45	7′ 12	The first star so bright as 7.8 m, seen nearly this whole hour [*in the usual sweeping zone of* 3°.]	......	612
5020	17 57 27.2	149 55 41	11.3	10	10 12	....	......	716
5021	17 57 40.3	146 27 18	315.5	3	7 15	One of the most difficult double stars, by reason of the excessive inequality of the individuals. It is the following of two about 2½′ distant, and the small star points exactly in the direction of the preceding star, by which alone I was enabled to get a measure. Distinctly seen with long attention, verifying a first imperfect glimpse hardly more than a mere suspicion. Mirror newly polished, and in fine order.	L. 7564	696
5022	17 58 18.0	142 5 42	114.7	3	10 13	....	......	599
5023	17 58 45.6	130 36 47	275.9	5	8′= 8′	....	......	456
	51.5	36 46	275.8	8	10 10	This obs makes P D 26′, but the star was twice found by the P D of ʃ 456 in the equatorial measures (which see) so that 10′ misreading must have taken place.	......	479
5024	17 59 32.0	153 6 16	3.6	30	5 11	A third star 15 m near	B. 6329	481
5025	17 59 —	130 39 —	100.4	47.9	9 9	Mean epoch 1836.506........................	......	E
5026	17 59 34.4	114 7 47	130±	..	......	Course double. In a nebula..................	......	793
5027	17 59 44.4	144 23 25	59.2	15	8′ 9	....	......	469
5028	18 0 21.5	129 22 20	151.7	20	9 9+	A third star 8 m follows........................	......	718
	26.9	22 0	153.4	15	9 9	....	......	462
5029	18 0 25.8	147 52 34	121.7	2	8′= 8′	Pos 121.6, 121.9........................	L. 7584	712
5030	18 1 17.2	113 41 47	281.0	30	5′ 13	....	A. 2093	453
5031	18 1 50.5	137 24 14	101.2	18	9 9+	....	......	464
5032	18 2 —	133 14 —	335.8	1½	7 10′	Epoch 1837.663	B. 6342	E
5033	18 2 20.8	138 53 11	120.5	10	8 11	A third dist 30″ pos about 30° as estimated by diagram.	L. 7611	465
5034	18 3 30.4	136 3 55	93±	1¼	9 9′	Power 240; ill defined	B. 6349	464
	33.0	3 49	93.0	1½	9 10	A very fine double star	......	463
5035	18 3 35.4	111 5 35	267±	18	4 13	μ 1 Sagittarii	A. 2096	793
5036	18 5 13—	124 9 30	......	..	7 10 8 11	Two d stars, classes 3 and 4	......	E
5037	18 5 21—	121 11 30	......	..	7 10	Class 4th. Review........................	......	E
5038	18 6 13.5	161 51 38	299.6	12	9′ 10	....	B. 6361	614
	17.5	50 52	304.7	18	8 10	Dist by oblique transit = 15″.32	......	605
——	18 7 54.7	145 37 55	358.7	30	8 8′	Δ. 220	L. 7649	469
5039	18 8 15.5	156 9 8	129.3	18	9′ 10	....	......	612
5040	18 10 51.3	138 20 16	154.3	2	11=11	....	......	467
5041	18 12 0.5	143 43 3	260.5	2	7′ 9	Neat star	B. 6385	789
5042	18 12 12.0	136 0 26	177.5	15	9 12	....	......	725
5043	18 16 51.7	173 34 46	10.7	30	6 13	Pos 11.7, 9.8	L. 7615	594
5044	18 17 8.2	145 37 56	358.2	6	9 9′	....	......	469
5045	18 18 4.3	138 6 11	22.8	6	7 12	....	......	725
5046	18 18 14.9	138 27 36	81.4	4	10=10	A star 9 m n f, 20 or 30″ dist	......	465
——	18 21 38.9	128 49 50	359.8	30	7 7′	κ Cor. Aust = Δ. 222........................	B. 6428	718
——	18 21 59.1	100 54 38	250.8	12	7′ 12	Pos not satisfactory	Σ. 2325	591
5047	18 22 —	138 7 —	......	..	6′ 7	Class 5. Zone review	......	E
5048	18 23 12.2	161 33 27	353.7	35	5′ 14	(ζ *Pavonis*) not very well defined................	B. 6436	614

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5049	18 24 40.4	137 12 1	272.3	25	7′ 12	....	L. 7770	725
5050	18 24 46.2	147 32 16	108.0	12	10 10′	....	......	471
5051	18 25 6.0	118 57 2	230.6	5	9′ 10	....	......	475
——	18 25 12.9	104 49 29	299.9	20	8′ 8′+	....	Σ. 2337	719
5052	18 26 43.5	131 35 2	133.7	3	10=10	134.1, 133.4, neat ✻..........	......	718
5053	18 29 —	145 55 —	......	..	6′ 9	5th class. Zone review	B. 6460	E
5054	18 29 37.2	137 48 18	330.0	10	9 11	....	L. 7810	465
	43.8	50 6	326.1	20	8′ 9	....	......	725
5055	18 29 42.4	143 1 24	80.3	10	9 = 9	Pos 80.5, 80.2..........	......	468
	44.3	1 7	77.7	12	8′ 8′	....	......	789
5056	18 31 —	145 50 —	198.8	32.1	7 10	Mean epoch, 1835.916. [Nisi P D = 145 56.] ..	......	E
5057	18 31 38.3	144 5 31	75.7	8	11=11	Another 15 m nearly south	......	710
5058	18 34 3.1	141 0 32	295.3	12	9 13	....	......	468
5059	18 34 16.3	139 47 52	{ 257.0 { 205.1	12 15	7 12 13	} Triple	B. 6477	467
5060	18 35 —	140 36 —	......	..	8 12	Class 2, 3. Zone review	......	E
5061	18 35 53.6	164 23 ±	289±	3	10 11	....	......	605
5062	18 35 57.7	152 22 21	206.1	40	4′ 15	(λ Pavonis)..........	B. 6489	481
5063	18 36 13.2	169 11 11	121.0	3	11′ 13	....	......	611
5064	18 36 49.6	127 10 6	271.5	20	6′ 12	....	L. 7858	485
5065	18 37 19.0	148 6 34	20.3	20	7′ 10	....	......	712
5066	18 39 2.2	131 14 56	88.3	8	8′ 11	Neat star..........	L. 7869	479
	3.5	15 2	90.0	12	6′ 10′	Very exactly in the parallel	......	718
5067	18 39 29.9	141 7 23	273.0	1½	10 11	Delicate. A ✻ 13 m follows a little to the north ..	......	465
	32.8	8 31	276.3	2½	10 11	A 3rd 11′ or 12 m follows..........	......	729
	34.4	8 30	274.2	1½	9′ 10	Pos 274.5, 274.0. Perfectly divided ; definition excellent.	......	467
5068	18 40 8.1	144 32 6	361.2	10	9 11	....	......	469
	9.6	33 55	358.7	15	9′ 11	....	......	710
5069	18 40 42.1	152 0 59	{ 87± { 86.7	⅔ 15	9 = 9 8 12	A B } Triple. The large star being suspected to be close double, was (A + B) C } verified with 480. 320 was not enough, but the night does not bear magnifying well, and it is with the utmost difficulty I can discern a separation. The line of junction points very nearly to the small stars.	B. 6512	726
	44.6	1 40	{ 81.7 { 86.1	1 12	9 = 9 8 13	A B } A very close object. Barely seen (A + B) C } double with 240 ; well divided with 480.	......	727
5070	45.7	1 6	90.8	12	7 12	....	......	481
5071	18 41 7.1	112 12 11	53.1	15	8 8′	....	......	793
5072	18 43 31.5	170 14 4	61.3	15	9 12	Δ R A = 7ˢ.0..........	......	611
5073	18 43 53.9	112 56 44	60.3	..	6 10	(ν′ *Sagittarii.*) Cl IV. or V.	A. 2179	793
5074	18 45 58.3	168 50 51	346.5	30	9 10	Dist by oblique transits = 26″.87	......	611
	18 47 24.6	129 44 46	......	12	6′ 13	The position (208.8) is noted as "wrong" in the original MS. The diagram, estimated, would give about 230 or 240 for the pos.	L. 7932	479
	25.4	44 51	244.8	12	6′ 13	Pos 244.0, 245.6..........	......	718
5075	18 48 —	154 1 —	108.6	1.8	8′ 8′	Mean epoch, 1835.517	B. 6546	E
5076	18 48 44.0	153 14 30	205.0	6	10 11	....	......	600
5077	18 48 59.5	126 28 35	93.7	4	9 10	....	......	483
5078	18 50 35.4	135 56 2	313.4	15	8 9′	....	L. 7954	463
5079	18 50 47.8	138 26 35	244.4	18	9 9	....	......	467
5080	18 51 18.7	126 20 9	247.5	5	8 9	....	......	461
5081	18 51 49.7	144 1 6	166.3	18	10 10	....	......	710

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5082	18 53 5.5	109 28 58	91.0 107.4	6 18	6 11′ 6 12	Elegantly triple	......	722
5083	18 54 3.2	126 25 5	8.5	18	8′ 11	......	......	461
	4.2	24 10	5.7	16	8 11	[This obs gives 55 for the minute of R A. The earlier minute preferred.]	......	483
5084	18 54 54.1	127 17 50	38.7	2	6 = 6	(γ *Coronæ Australis.*) Pos 28.8, 28.6. [N.B. *No doubt ought to be* 38.8, 38.6. *The diagram agrees better with this, and the equatorial measures corroborate it.*]	A. 2206	485
	....	....	36.4	3	6 = 6	(γ *Cor. Aust.*) Superb D star. Pos 36.3, 36.5...	......	461
5085	18 55 30.5	150 17 51	239.1	2	8 11	Very neat ✻ ; a ⊕ near, n f	......	726
	33.3	17 56	236.8	3	8 11	......	......	480
	34.6	18 6	236.7	2	8 11	Pos 237.8, 235.7	......	481
5086	18 56 5.6	144 36 18	295.3	15	10 11	......	......	710
5087	18 56 28.6	144 24 4	24.7	15	9 12	......	......	710
5088	18 56 31.4	139 53 —	70.0	6	12 12	In the same field are the next, and two other nearly similar double stars, and one much fainter and closer which precedes, forming a curious family group.	......	467
5089	18 56 32.4	139 50 28	111.8	6	11 12	One of the same group of 5 double stars	......	467
5090	18 56 57.0	100 57 58	247.0	15	10 = 10	Good measure	......	591
5091	18 57 38.5	121 13 15	198.7	12	8 10	......	......	794
——	19 1 —	107 43 —	61.3	15.2	8 9′	Mean epoch, 1836.571	h. 1367	E
5092	19 1 16.9	137 38 4	353.4	18	8 8′	Pos 352.4, 354.5	......	463
5093	19 1 29.0	133 20 55	220.2 213.6	20 10	8 10 10 11	A B B C } Triple	......	472
5094	19 1 35.5	124 6 2	243.3	15	7 7+	Pos 242.7, 244.0	L. 8028	791
5095	19 2 21.5	121 12 20	248.6	15	9 9+	......	......	476
	22.3	12 9	255.4	20	9 9	......	......	619
	24.4	11 58	250.2	20	9 9	......	......	794
5096	19 2 35.0	100 51 28	70.2	15	9 10	......	......	591
5097	19 3 2.5	107 52 35	88.8	4	10 12	......	......	722
5098	19 3 18.4	126 31 30	254.3	3	10 = 10	......	......	483
5099	19 3 44.2	140 16 4	37.9	12	9 12	......	......	729
5100	19 4 36.6	146 26 12	163.8	20	6′ 12	......	B. 6612	710
5101	19 5 57.0	115 38 3	311.5	20	8′ 9	......	......	474
5102	19 7 4.6	151 34 36	335.3	10	10 10+	Definition terribly bad; position and distance in consequence very uncertain. Yet a superb sky.	......	716
5103	19 7 16.3	162 5 23	238.8	7	8 13	......	......	614
5104	19 7 40.5	141 20 58	36.2	15	9 = 9	Pos 35.7, 36.8	......	468
5105	19 7 50.4	139 49 4	230.7	12	9 11	......	......	729
	51.5	50 2	225.2	8	9 10	......	......	467
5106	19 9 6.1	169 7 36	207.4	15	9 13	Dist by oblique transit = 16″.56	......	611
5107	19 9 42.2	123 20 50	127.4	12	8 9	......	......	476
	51.1	19 27	132.4	15	8 10	[*Probably a mistake of* 10ˢ *in reading the chronometer in one or other of these observations.*]	......	791
——	19 10 22.7	134 46 17	79.4	25	5 7′	β 1 *Sagittarii.* Pos 79.5, 79.3	A. 2240	463
	23.4	46 15	76.0	..	6 8	Δ R A = 2ˢ.5. Pos 76.3, 76.7, 75.1	Δ. 226	472
	....	....	76.8	25	5 7	......	......	490
5108	19 12 24.6	148 32 52	68.0	15	10 11	......	......	712
5109	19 12 28.7	157 37 38	139.5 13.3	20 35	8′ 10 10′	Triple	......	612
	29.1	37 58	......	..	......	Double star. No particulars	......	610
5110	19 13 9.5	119 57 58	121.0	5	9′ 10	......	......	794
5111	19 13 28.5	123 11 55	90.0	20	9 9	......	......	476

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5112	19 13 35.1	108 18 32	229.6 50± 180±	18 20 25	8 8 8 12	Quadruple. The two distant stars estim by diagram	......	722
5113	19 14 25.0	119 37 44	121.9	25	6 11′	....	L. 8098	794
5114	19 14 —	144 39 —	130.9 270.7	$1\frac{3}{4}$ ..	6 11 6 7	A B. Some doubt A C. Epoch, 1837.663............	B. 6656	E
5115	19 15 29.2	130 12 12	66.8	8	9′=9′	....	......	488
5116	19 16 6.4	168 52 14	297.3	12	9 12	A 3rd * in the same line, opposite	......	611
5117	19 16 12.7	134 12 45	267.7	3	8 9	L white, S purple	L. 8105	472
5118	19 16 19.9	161 0 47	9.2	3	12 13	....	......	614
5119	19 18 2.7	116 20 4	290.4	3	9′=9′	Very neat star..............................	......	474
5120	19 18 39.9	120 3 22	171.7	2	8 11	Neat star....................................	......	475
5121	19 18 49.0	146 47 35	277.3	10	10 10′	....	......	712
5122	19 18 50.7	165 59 11	284.3	8	9 13	Dist by oblique transit = 17″.91	......	607
5123	19 19 9.7	156 45 52	2.7	20	9 = 9	....	......	603
5124	19 19 29.4	108 2 31	95.5	4	10=10	....	......	722
5125	19 20 13.9	140 16 18	294.5	20	9 9′	....	......	466
5126	19 22 29.5	169 48 34	327.7	4	11 11+	Dist by oblique transit = 9″.54	......	611
5127	19 22 54.1	176 30 6	284.1	4	10 11	Δ R A = 7^s.5. A large star s f	......	595
5128	19 23 40.9	108 58 18	112.7 125.9	30 4	8 10 10 10+	A B B C Triple	......	722
5129	19 24 59.3	137 7 20	120.7	15	9′ 9′	....	......	463
5130	19 26 24.0	140 14 33	145.0	6	8′ 12	....	......	465
5131	19 26 41.0	121 16 45	318.0 212.7	14 10	9′ 9′ 9′ 9′	A B A C Triple	......	618
5132	19 27 19.2	156 40 37	132.0	15	8 11	Dist by oblique transit = 21″.48	......	610
5133	19 27 29.6	117 20 17	14.6	15	9 9′	Good measure................................	......	475
5134	19 27 36.2	131 55 56	135.9	10	9 12	....	......	479
5135	19 29 2.9	145 52 15	177.3	15	9 11	....	......	710
5136	19 31 3.2	157 31 55	262.3	$2\frac{1}{2}$	15=15	Very delicate. Taken at first for a very faint nebula	......	610
5137	19 31 20.9	163 12 2	191.3 308.7	30 35	7 12 12	Pos A B 189.3, 193.0, 191.7 Pos A C 309.9, 308.3, 307.9	B. 6717	606
5138	19 31 38.1	134 41 22	36.1	12	9 10	....	......	463
	44.6	42 9	32.9	12	8 11	....	......	489
5139	19 31 48.4	133 50 45	134.5	12	9′ 12	....	......	472
5140	19 33 47.8	155 19 26	89.3	$1\frac{1}{2}$	8 = 8	Fine double star............................	L. 8190	708
5141	19 33 55.7	152 12 49	341.7	15	7′ 11	....	L. 8194	726
5142	19 34 9.1	138 46 16	321.6	6	11 12	....	......	467
5143	19 35 32.3	136 53 43	332.5	7	10=10	....	......	463
	33.9	53 39	337.8	4	10 10′	....	......	490
5144	19 35 36.4	115 55 51	13.2	8	9 10	....	......	474
5145	19 36 47.7	125 24 51	152.4	20	8 10	....	......	492
5146	19 37 16.2	144 4 34	280.8	5	9 12	Two others, 11 and 13 m, near.................	......	710
5147	19 37 37.4	120 25 24	81.3	4	10 12	....	......	478
5148	19 37 57.9	135 47 29	317.4	12	7 12	....	B. 6740	463
5149	19 37 59.9	169 13 18	150.9	40	8 9	Dist by oblique transits = 43″.11. Another, 8 m, near.	......	611
——	19 39 2.7	145 23 31	147.7	18	8 8	L yellow, S pale green	Δ. 227	469
	4.0	23 30	148.9	30	7 7+	Fine object	B. 6745	710
5150	19 39 15.3	141 39 31	261.3	15	9 12	....	......	615

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5151	19 39 53.5	127 18 30	358.7	10	9 10	....	......	485
——	19 40 22.4	114 52 16	312.8	10	9′ 10	....	h. 2899	474
	22.7	52 33	321±	..	10 10′	Clouded thick over immediately on this obs. [*Pos precarious. The MS. makes the estimated dist only 3″, but this must be some mistake, as the diagram contradicts it, and would agree better with* 10 *or* 12″.]	......	473
5152	19 42 45.7	120 41 42	151.5	3	9 10	Neat star..	......	477
	46.1	42 14	157.2	3	9′ 10	Pos 157.3, 158.6, 155.8, 157.1..................	......	619
5153	19 44 0.8	169 34 27	126.8	25	7 13	Large star single, 180 and Δ....................	L. 8218	611
——	19 44 7.9	114 21 6	170.6	20	7′ 11	h. 2904	L. 8262	474
5154	19 44 14.0	122 47 47	200.1	5	9′ 10	....	......	478
5155	19 44 51.6	151 28 25	193.0	4	10 11	Pos 193.6, 192.3..................................	......	480
	....	....	192.7	3	10′ 11	Viewed and measured..............................	......	726
5156	19 46 22.3	125 16 7	129.3	10	10 19+	....	......	492
	25.0	15 55	126.7	18	9′ 10	....	......	491
5157	19 46 42.4	136 48 33	279.8	12	9 13	....	......	463
5158	19 46 52.1	165 2 8	147.5	..	9′= 9′	Neat star. Dist by oblique transit = 13″.64......	......	607
5159	19 48 11.0	130 57 29	34.0	20	9 9′	....	......	488
	11.2	56 36	33.3	20	9 9′	L pale red, S pale blue	......	479
5160	19 48 45.9	136 40 26	163.5	18	9 12	....	......	463
5161	19 49 28.2	134 49 57	316.8	8	10 10′	....	......	489
5162	19 49 36.1	161 17 14	291.7	7	8′ 11	5 stars 10 and 11 m precede, forming an elliptic arc. Distance by oblique transit = 8″.34.	......	614
5163	19 49 52.3	153 31 24	255.3	1¼	8 9	Not well divided with 180, well elongated with 320. Fine ✱, but wants light for the 6 inch equilateral triangle.	B. 6780	727
	52.4	31 49	248.5	1½	7′ 8	Pos 247.9, 249.1. Fine ✱; measured with power 320.	......	708
5164	19 50 27.6	117 38 42	124.6	10	9 9′	....	......	475
5165	19 53 31.6	122 32 23	306.4	30	6′ 13	Large star single.................................	L. 8322	620
5166	19 53 54.3	137 16 52	252.7	6	10 10′	....	......	463
5167	19 56 30.6	154 6 14	32.1	12	9 10	....	B. 6800	727
	32.3	6 47	34.2	6	9 10	Dist by oblique transits = 7″.27	......	602
	33.5	6 26	35.2	6	8 9	Neat star..	......	708
5168	19 56 49.5	120 13 6	......	..	7′ 12	No measures taken................................	L. 8346	478
	50.9	12 47	79.2	18	8 11	A third follows nearly in the parallel	......	495
	51.2	12 18	83.2	15	7 12	A third ✱ 12 m follows..........................	......	477
5169	19 57 18.1	137 10 28	129.3	2	10′ 11	Neat, among many stars	......	463
5170	19 58 25.2	125 39 30	316.8	12	8 11	Pos 315.3, 318.3..................................	......	492
	27.6	39 15	317.4	15	8 11	....	......	491
5171	19 59 1.0	154 55 29	{ 305.4 { 334.3	12 25	7 10′ 10′	A B } A C }	B. 6807	727
5172	19 59 41.2	137 32 21	1.3	40	8′ 11	....	......	725
5173	20 0 2.7	126 31 20	118.7	15	5′ 14	Very delicate	M. 9260	485
5174	20 0 4.7	140 47 40	240.2	18	7′ 13	....	......	615
	7.3	48 31	242.5	15	7′ 14	....	......	729
5175	20 0 41.8	172 27 22	{ 112.7 { 198.1	6 9	10 11 11′	A B } A C } Triple	......	707
5176	20 1 1.6	161 22 6	327.3	1¼	13=13	Extremely delicate. *Between two nebulæ*	......	614
5177	20 1 8.9	147 28 31	23.2	4	9 = 9	Pos 23.7, 22.7. Neat ✱	B. 6812	470
5178	20 2 50.4	124 37 27	7.3	3	7 10	Very ill defined. Power 240	L. 8373	492
	50.8	37 35	12.0	2	7 10	Pos 10.7, 13.2. An elegant D ✱, best seen with 12 inches aperture.	......	491
5179	20 3 7.6	136 33 24	139.5	3	10=10	....	......	463

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5180	20 3 31.5	118 38 47	221.3	4	10 11	....	......	475
5181	20 4 52.6	122 24 28	6.8	7	10′ 12	....	......	620
5182	20 4 57.9	171 30 9	352.7	30	5′ 12	....	L. 8331	795
5183	20 5 15.9	126 57 18	222.8 183.7	30 40	6 13 14	....	L. 8385	724
5184	20 5 41.8	136 26 46	131.5	12	8 13	....	......	725
——	20 6 28.1	130 41 52	118.7	15	8 = 8	....	Δ. 230	718
5185	20 6 38.8	149 15 11	64.6	15	8 12	Pos 64.1, 65.2	M. 9319	470
5186	20 9 7.1	167 44 39	91.4	8	10 10+	Neat stars. Δ R A = 2ˢ.0	......	611
	12.8	44 30	92.1	..	9 9	Δ R A = 3ˢ.0	......	607
5187	20 9 31.6	144 47 15	324.1	12	8′ 15	Very delicate. A good measure	B. 6838	469
5188	20 9 57.9	119 43 47	324.7 73.5	25 5	7′ 8 10	A B } Another neat D ∗ n f. [N.B. This obs gives A C } 8ᵐ for the minute of R A.]	L. 8409	475
	60.2	43 44	329± 72.3	25 3	8 8 8 11	A fine triple star	......	495
	61.8	43 39	321.0 65.6	25 4	7 8 7 11	....	......	477
5189	20 10 39.7	127 26 21	296.8	4	9 10	....	......	724
	40.6	25 20	292.8	4	9 10	....	......	483
5190	20 10 52.8	132 34 15	268.7 299.9	40 15	6 15 16	Triple. Very delicate	M. 9354	472
5191	20 11 5.0	121 35 15	257.3	3	10′=10′	....	......	618
5192	20 11 59.3	177 42 1	328.4	25	8 8+	Pos 329.1, 328.7, 327.5	......	800
	103.3	41 44	325.5	20	8 8	....	......	799
	....	....	331±	18	8′= 8′	Fine ∗. Too far from merid for any good place or measure.	......	797
5193	20 12 36.1	147 16 14	331.4	20	9 10′	L. Very red	......	735
	39.5	14 41	333.2	15	9′ 10	Follows α Pavonis 36ˢ.5, and is 1′ north of it	......	470
	....	16 26	......	..	......	Follows α Pavonis on its parallel	......	710
5194	20 13 23.8	159 37 20	247.6	3	7′ 14	Pos 246.0, 249.3; extremely delicate	B. 6849	604
	25.0	36 57	251.1	3	8 15	252.4, 249.9; one of the most beautiful and delicate double stars. A slight dew-cloud, though it does not destroy the sharpness of definition, yet renders the measures difficult. Great care however taken.	......	614
5195	20 13 41.5	125 17 40	136.8	30	10 11 10 10	Triple. The small star lies exactly half-way, and in the line of junction of the two larger.	......	493
5196	20 13 51.5	152 59 26	283±	18	9′ 15	The preceding of two	......	726
5197	20 14 7.0	153 0 11	211.3	30	7′ 13	The following of two	......	726
5198	20 15 30.0	127 2 55	234.7	3	9′ 10	....	......	483
5199	20 16 9.3	167 27 17	207.5	25	8′ 13	....	L. 8413	607
5200	20 16 28.2	158 55 53	317.8	12	8′ 11	L white; S purplish; Dist by oblique transit = 15″.33	......	610
5201	20 17 9.4	134 35 2	121.0	8	10 11	....	......	728
——	20 17 17.1	165 55 18	12.2	25	7′ 8	Pos 12.1, 12.4. Dist by oblique transit = 16″.72	Δ. 232	607
5202	20 19 4.1	120 34 48	82.0	10	9′ 10	....	......	477
5203	20 20 6.9	129 41 23	125.7	8	10 13	....	......	718
5204	20 20 19.4	135 55 2	31.2	3	8 9′	Among many	......	463
5205	20 20 47.3	126 4 30	60.7	15	8 13	....	......	483
5206	20 22 10.1	121 56 33	189.9	15	8 12	....	L. 8476	477
5207	20 24 3.1	124 29 48	257.3	15	8 11	Pos 259.3, 255.3	......	493
	3.1	29 10	256.2	15	7′ 11	A third near	......	491
5208	20 25 5.4	128 48 38	270.7	5	10 11	....	......	488
	....	48 15	270±	..	......	Pos est by diagram	......	718

No.	R A. 1830.0. h. m. s.d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5209	20 25 35.9	137 52 35	193.2	45	3 16	(*a Indi*) Pos 193.5, 193.0. With the utmost care I see well a companion 16 m as here described, which had eluded all my prior examinations of this star. But the night is most glorious. As to any companion at 5″ dist, as stated by Mr. Dunlop, there is *now* most certainly none, nor could this, I apprehend, have been seen with his instrument and power. With 12 inches aperture I see it; with 9, with the utmost difficulty it is *discernible*, but so seen I should estimate its distance at full 60″.	A. 2417	729
——	20 27 7.1	117 52 27	123.9	7	10 10′	......	h. 2982	475
5210	20 29 18.2	117 38 52	270.0	8	9′ 11	......	......	475
5211	20 29 28.8	132 59 34	301.0	20	6 10	......	L. 8512	728
5212	20 31 3.9	114 45 58	272±	18	8′ 10	[*The pos set down is* 27.3 (—0.7 *for zero*) *but the diagram contradicts this, and doubtless it should have been written* 273.]	......	473
5213	20 31 51.8	121 6 43	137.9	15	9′=9′	......	......	494
5214	20 32 ±	165 55 33	312.3	30	8 9	R A by obs 20 32 15.4; but there is a remark "just out of the field," so that this is a few seconds too great.	......	607
5215	20 32 42.1	126 7 30	187.3	18	9 12	......	......	493
5216	20 34 42.7	128 12 56	197.5	12	9′=9′	......	......	724
5217	20 34 48.4	155 4 57	231.8	6	10′ 11	Dist by oblique transit=7″.62	......	602
5218	20 34 55.7	121 5 23	187.9	16	7′ 13	[16 probably a mistake in writing for 6.]	L. 8546	494
	60.6	5 7	188.9	6	6′ 13	Very beautiful object	......	620
	64.6	5 0	190.3	8	6′ 13	A most beautiful object	......	618
5219	20 35 12.5	125 19 25	327.0	5	11 12	......	......	491
5220	20 36 17.0	117 28 37	357.7	18	8 10	[The diagram contradicts the reading of the position wire which gives 224.3 for the position.]	L. 8555	475
5221	20 36 24.3	156 19 28	124.3	12	10 10+	Dist by oblique transit = 8″.194, presuming 124.3 to be the true angle of position.	......	610
5222	20 37 13.8	134 36 20	279.3	25	8 13	A star 5 m precedes	M. 9584	728
——	20 37 21.7	153 3 7	97.8	2	6′=6′	Superb D ✻; Pos 97.8, 97.8 with 480. Excellent measures.	B. 6917	726
	22.2	2 51	97.5	1½	6=6	Pos 98.7, 96.3; very fine; measures taken with 320 and apertures 12 inch circle and equal triangle.	R. 26	481
	22.4	2 46	101.5	2	7=7	Pos 102.3, 100.7; superb star	......	727
	22.5	2 47	98.9	2	7=7	Pos 99.5, 98.8, 98.3	......	602
5223	20 38 32.5	147 0 59	114.1	12	9′=9	......	......	710
5224	20 39 18.5	124 23 47	167.5	25	5 9	Pos 168.2, 166.8 (*a Microscopii*)	B. 6922	493
	21.5	23 35	168.4	30	5′ 9	Pos 167.4, 169.4	M. 9606	491
5225	20 39 48.2	131 52 17	109.5	40	7 10	Small ✻ blue	......	718
5226	20 39 52.9	117 59 22	70.8	15	7′ 8′	L pale yell; S pale blue	M. 9611	475
5227	20 40 3.3	128 31 5	......	..	......	No particulars. Double	M. 9613	724
5228	20 40 29.5	131 32 6	101.7	30	8 10	L yell; S blue	L. 8586	488
5229	20 40 53.2	134 14 18	66.1	4	8 12	......	......	466
5230	20 41 43.3	166 3 40	164.2	15	9 11	Dist by oblique transit = 16″.66	......	607
5231	20 41 57.4	161 4 0	111.5	10	8 8+	Pos 113.0, 111.3, 110.3	L. 8573?	604
5232	20 42 57.5	146 33 29	12.4	20	9′=9′	A third 12 m precedes, making nearly an isosceles triangle.	......	469
5233	20 43 23.6	173 55 56	276.8	15	6′ 13	Very ill defined; small ✻ barely seen	L. 8528	796
	23.9	56 6	274.5	15	6′ 12	Δ R A = 18ˢ	......	795
5234	20 44 32.0	124 46 3	91.2	12	10=10	......	......	493
	34.8	45 55	93.8	18	9′ 10	......	......	491

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5235	20 44 44.0	174 59 36	......	..	......	An ill defined elongation. A bad night	L. 8511	800
	45 31.6	58 34	92.0	2½	8 = 8	A fine double star	......	799
	45 36.9	59 20	92.1	2½	7′ = 7′	Fine star. Good measures	......	795
	....	....	90.5	4	8 8	A fine double star. Taken in a widely extrameridian reviewing sweep, but readily identified by a rough place obtained by mixed estimation and measurement with the foregoing.	......	797
	....	0 5	91.3 :	2½	8 = 8	Ill seen but double	......	796
5236	20 46 56.8	128 21 25	301.8	3	10 = 10	Neat double ✱, ☽	......	483
	57.0	23 29	306.9	4	10 10′	......	......	724
5237	20 48 18.2	163 56 28	274.6	3	10′ 12	......	......	625
5238	20 49 34.3	135 3 13	14.0	25	9 = 9	......	......	463
——	20 49 35.2	133 39 14	75.1	60	6′ = 6′	[A mistaken wire assumed and corrected]	M. 9689	489
	....	....	73.8	90	6′ = 6′	Viewed and measured	Δ. 236	728
5239	20 51 31.3	145 59 38	210.7	12	9′ = 9′	......	......	469
	33.1	59 5	213.3	18	9′ 10	Neat star	......	710
5240	20 53 5.0	157 42 39	26.1	15	9′ 12	Dist by oblique transit = 11″.52	......	610
5241	20 54 18.3	146 9 12	39.8	15	11 11+	......	......	710
5242	20 54 47.3	123 0 40	265±	20	8 12	......	M. 9741	618
5243	20 54 49.5	147 42 26	96.0	18	9′ = 9′	......	......	470
——	20 55 32.3	115 25 24	216.1	4	10 = 10	......	h. 3007	474
5244	20 55 43.9	95 9 33	138.8	15	9 10	......	......	739
5245	20 56 —	175 17 19	195.0	6	8 8′	Pos 195.7, 194.3. A fine D star	......	799
5246	20 57 58.5	145 15 4	116.8	1½	8 = 8	Pos 116.3, 117.1, 117.1. Close as this star is, the night is so perfect that it needs no higher than the usual sweeping power for its measurement being most beautifully divided.	B. 6980	710
5247	20 58 22.7	139 32 20	186.9	20	8′ 9	......	......	496
	26.5	138 31 39	189.5	25	9 9	[One or other degree of P D wrong]	......	467
5248	21 0 53.7	121 21 59	324±	4	11′ 12	......	......	620
5249	21 1 17.3	128 51 21	331.3	10	8′ 14	......	......	718
5250	21 1 20.7	154 23 0	302.7	12	8 9	......	......	727
	21.9	22 52	304.3	10	9 11	Dist by oblique transit = 16″.40	......	602
5251	21 1 44.7	113 47 23	308.2	7	9 9′	Excellent measure	......	473
	47.2	48 0	305.2	4	9 9′	......	......	474
5252	21 2 —	105 43 —	328.0	2.1	8 8	Mean epoch, 1836.127	......	E
5253	21 3 29.3	129 16 13	183.1	10	8 9	Neat star	......	718
5254	21 4 —	130 16 —	......	..	7 8	5th or 6th class. Reviewed	B. 6995	E
——	21 4 48.5	116 36 26	304±	1½	9′ = 9′	Very neat double ✱. [R A by obs = 5 m, but the obs in my 5th Catal makes the minute 4. Both being found correctly reduced, the earlier minute is preferred.	h. 3014	474
5255	21 6 42.3	157 37 12	288.0	25	9′ 12	Dist by oblique transit = 34″.33	......	610
5256	21 6 52.2	151 0 2	153.3	25	8 8+	......	......	613
5257	21 7 13.4	141 24 29	269.8	12	9′ 10	......	......	498
5258	21 7 41.9	144 9 31	296.2	3	6 10	(θ *Indi*). Beautiful	B. 7003	468
5259	21 7 56.2	137 45 49	138.7	25	7 11	A third near	M. 9860	490
5260	21 8 51.1	162 31 1	270.3	30	6′ 12	Large star single	B. 7006	625
5261	21 8 56.3	176 35 16	203.7	5	8′ 8′	Pos 203.8, 203.7, 203.5, 201.7	......	800
	....	....	205.6	8	9 9	Very much past mer. No good place or exact measure attainable.	......	797
5262	21 10 13.9	170 45 58	96.4	25	7 11	Δ R A = 12ˢ.5	B. 7009	796
	23.7	46 40	94.4	25	7 11′	......	......	623
5263	21 10 46.4	121 37 35	91.9	15	8 13	......	......	477
5264	21 11 51.4	125 42 40	73.7	20	9 12	......	......	491

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5265	21 12 17.6	113 5 48	196.7	20	9 9′	L red, S blue	......	473
5266	21 14 32.2	121 49 13	279.5	15	8 11	......	......	494
	33.3	49 38	275.5	10	9′ 11	......	......	620
	34.6	50 17	280.7	10	9′ 11′	......	......	477
5267	21 15 —	135 47 —	56.7 183.4	5 ..	7 11 7 9′	A B A C } Epoch 1834.479	B. 7019	E
5268	21 15 48.8	164 15 10	233.0	12	11 11′	......	......	625
5269	21 16 20.6	114 7 58	342.6	4	10=10	......	......	473
5270	21 17 29.1	150 55 37	56.4	18	7′ 12	Very ill defined	......	613
5271	21 17 49.7	115 37 7	40.7	1½	10 11′	Pos unsatisfactory	......	474
5272	21 18 24.4	132 9 14	290±	20	8 13	Pos estimated from diagram	......	737
5273	21 19 32.1	139 6 14	102.5	3	10 11	......	......	467
5274	21 20 5.1	125 32 58	160.8	20	9′= 9′	......	......	493
	9.6	32 25	158.9	25	9 9′	......	......	491
5275	21 20 27.0	127 16 44	199.5	45	7 12	......	L.8829	724
5276	21 23 21.1	146 8 56	13.3	4	11=11	......	......	469
5277	21 23 25.6	144 3 2	35.5	8	10′ 13	......	......	498
5278	21 23 48.7	173 29 5	......	..	......	(λ Octantis) not noticed as double	B.7042	795
			81.0	3	5′ 9′	Viewed to verify an obs with the equatorial. It *is* a fine double star. The equatorial observation was no illusion. Pos 79.6, 82.3.	......	797
5279	21 23 55.9	123 6 ±	288.2	5	11=11	......	......	620
5280	21 25 5.8	121 17 45	349±	7	10 10′	......	......	495
5281	21 26 37.3	158 18 48	217.3 213.4	30 3	9′ 13 13=13	A B B C	......	610
5282	21 28 —	107 10 —	80.3	18.0	9′ 10	Epoch 1836.641; Nisi P D = 107° 5′	......	E
5283	21 28 45.1	129 13 20	84.1	2	11=11	......	......	488
5284	21 28 —	107 4 —	268.9	52.2	8 10	Epoch 1836.641	......	E
5285	21 29 26.4	120 13 28	290.5	10	9 10	......	......	494
	30.9	12 24	292.4	12	8′ 9′	......	......	495
	31.3	13 59	294.1	8	9 10	......	......	477
5286	21 31 8.9	148 39 11	91.7	6	9 10	......	......	470
5287	21 31 15.4	165 1 4	319.6	3	10′ 11	Neat star	......	625
5288	21 32 5.6	128 42 2	56.1	15	8 10	......	L.8887	488
5289	21 32 29.5	171 22 51	46.8	10	10′ 12	......	......	795
5290	21 32 41.1	144 54 15	287.0	10	9′ 11	......	......	469
5291	21 32 45	104 59 —	......	..	8′ 9	Class 3. Zone review	......	E
5292	21 33 34.5	175 32 19	130±	3	7′ 10	Too ill defined for measure. Pos from diagram....	......	799
	....	......	......	..	......	Seen double, but night too bad for measure	......	800
5293	21 35 8.8	122 25 44	252.9	15	8′ 13	......	......	495
	9.8	25 13	252.1	15	9 12	......	......	494
5294	21 35 45.5	150 59 7	193.2	4	9′= 9′	......	......	613
5295	21 35 58.5	165 41 4	204.7	25	9 10	Pos 204.1, 205.3	......	627
——	21 36 12.1	117 29 27	188.7	16	9′= 9′	......	h.3054	475
——	21 37 9.4	138 4 0	13.7	20	5′ 10	Pos 13.5, 14.0; "double" in the B. catal., but it is there stated that the chief ✱ is the *following*, which is an error.	B.7080	490
	9.9	4 18	13.5	20	7 11	......	......	497
5296	21 37 44.6	121 40 54	335.7	30	5′ 10	(θ *Piscis Australis*)	A.2587	495
	45.0	40 43	336.0	30	5′ 10	......	......	494
	46.2	41 2	333.9	25	5 13	Large star single with 320	......	620
——	21 40 57.1	118 43 37	256.6	20	8′ 11	......	h. 3059	475
5297	21 41 48.0	163 22 3	304.5	5	11 13	......	......	625
5298	21 43 49	106 39 —	......	..	8 9	Class 4. Zone review	......	E

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5299	21 43 49.5	130 44 10	242.1	30	8′ 8′	Pos 242.6, 241.6	......	737
	51.0	44 28	242.0	30	8 = 8	......	......	488
	55.2	44 35	240.8	30	8′ = 8′	Δ R A = 3ˢ.0. R A unsatisfactory in this ʃ	......	487
5300	21 44 8.7	150 7 56	7.2 273.0	30 2½	8′ 11 11 12	A B B C	......	470
5301	21 44 37.3	168 7 5	203.7	12	9 10′	Pos 203.9, 203.5. Neat ✱	......	623
	38.6	6 49	206.1	8	8′ 10	Pos 207.0, 205.3. Neat ✱	......	627
5302	21 44 59.6	143 50 55	349.2	12	8′ 11	......	L. 8955	469
	62.5	51 11	347.3	10	8′ 11	......	......	498
	63.0	51 47	348.6	12	8′ 12	......	......	730
	68.6 :	49 55 :	347.3	8	8 11′	[*The reductions of this sweep are very precarious for want of good fiducial stars.*]	......	499
5303	21 45 28.2	133 22 7	44.1	25	9 10′	......	......	728
	28.7	21 32	45.5	15	9 11	......	......	489
5304	21 45 38.2	121 32 13	253.9	8	10 10	......	......	494
5305	21 45 57.7	131 50 21	244.3	20	9 9	......	......	737
5306	21 46 3.3	166 55 44	71.3	30	6 11	......	B.7098	627
5307	21 46 6.0	121 43 24	161.1	25 10	9 { 11 13	Triple. All 3 exactly in a line	......	495
	9.9	43 27	161.3	..	......	Triple. One L, 2 small in one line	......	619
5308	21 46 29.3	136 12 13	315.3	18	9 9′	......	......	490
5309	21 46 56.6	141 52 39	169.2	5	9′ = 9′	......	......	468
——	21 47 54.3	118 34 27	295.8	5	9′ 10′	The former obs makes pos = 287.0	h. 3068	475
5310	21 49 8.6	168 32 10	251±	4	11 12	Ill defined	......	623
5311	21 49 41.9	119 52 37	298.2	30 30	8 11 11	Very nearly an equilateral triangle	......	475
5312	21 50 1.6	161 51 22	359.3	30	10 11	......	......	625
5313	21 53 3.9	144 40 4	87.7	3	11 12	......	......	469
5314	21 53 51.4	133 32 10	56.8	12	8′ 11	Pos. 55.3, 58.3	......	489
5315	21 55 33.2	128 31 8	149.5	20	9 9+	......	......	724
5316	21 55 —	149 54 —	142.2	1½	8 10	Epoch, 1834.6 ± the northern of two	M.10234	E
5317	22 0 58.4	149 39 41	98.3	15	9 9′	......	......	470
5318	22 1 13.3	171 17 38	123.9	12	9 = 9	Points a little north of ε Octantis, which is very near it	......	796
	25.9	18 10	118.9	12	10 = 10	Points a little n of a ✱ 5 m which precedes it	......	623
5319	22 1 53.8	129 9 0	109.2	2	8′ = 8′	Very fine double ✱	L.9047	484
	55.2	9 10	111.9	2	8 = 8	Pos 111.8, 112.8, 111.2, excellent measures	......	486
	58.7	8 9	105.3	2	8 = 8	A fine double star	......	737
5320	22 2 16.5	146 17 40	264.1	12	9 12	......	......	499
5321	22 2 40.6	167 30 44	97.5	2	11′ = 11′	Difficult to measure	......	627
5322	22 7 12.8	93 44 2	203.3	12	10 = 10	......	......	739
5323	22 7 42.3	151 39 36	23.5	20	8′ = 8′	R A somewhat uncertain	......	501
5324	22 7 58.3	114 33 22	357.3	10	8 12	R A somewhat uncertain	......	621
5325	22 9 28.7	163 39 24	270.0 98.9	25 30	9 9′ 9 12	A B A C Δ R A = 5ˢ.0	......	625
5326	22 9 52.3	127 32 24	302.0	5	9 9′	? Position; micrometer deranged	......	484
——	22 10 43.6	160 51 44	83.9	25	6′ 9	Pos 83.4, 83.3, 84.9 (Δ 238)	B.7154	627
5327	22 10 46.3	155 59 49	307.9	30	9 9′	......	......	610
5328	22 11 58.5	155 58 44	116.3	5	11 11′	......	......	610
5329	22 12 11.0	94 25 3	97.6	6	10 10	......	......	739
5330	22 14 0.6	130 34 33	275.9	3	11 11	Neat star	......	737
5331	22 14 20.2	152 49 9	9.8	12	10 10	......	......	501
5332	22 14 51.9	132 53 3	244.4	10	9′ 11	Pos 243.4, 245.5	......	728
	56.1	53 3	250.9	10	9 11	......	......	489

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5333	22 15 6.0	152 25 54	236.6	18	10 11	....	......	501
5334	22 15 8.5	155 49 52	282.8	8	5 11	(*δ Tucani*) 283.3, 282.3	A.2760	602
5335	22 15 18.1	136 9 1	85.5	5	10=10	....	......	490
5336	22 16 35.2	164 44 50	24.4	8	10′ 13	....	......	625
5337	22 16 58.3	135 45 12	21.7	12	10′=10′	....	......	490
5338	22 17 48.6	142 39 7	190.7	25	7′ 12	....	L.9133	730
——	22 19 35±	134 37 ±	225±	..	5′ 9	L yell, S bluish. Pos est by diagram (δ^2 Gruis) ..	Δ. 239 B.7173	728
5339	22 20 24.5	164 45 44	131.4	12	9′ 11	....	......	627
	38.8	46 47	134.2	8	10 12	....	......	625
5340	22 20 54.3	152 16 1	304.3	2	10 10′	Pos 300.3; 304.3 better..................	......	501
5341	22 21 32.5	137 10 28	94.0	2	10′=10′	Neat star..............................	......	490
——	22 21 47.3	123 12 23	171.1	30	5 9	(*β Piscis Australis*) fine D ✻	B.7176	494
	47.8	12 26	169.3	25	5′ 9	Pos 169.3, 169.4..........................	Δ. 240	495
	47.9	12 44	170.0	30	4′ 6′	Pos 170.7, 169.4	......	492
	49.0	11 ±	170.9	25	5 9′	Pos 172.1, 170.5, 170.0....................	......	620
	49.3	9 ±	173.5	25	5 9	Pos 173.7, 173.8, 172.9; P D rude, being beyond the sweep more than a degree.	......	619
	49.4	12 29	169.9	30	4′ 7	....	......	493
5342	22 23 25.5	156 55 30	73.3	5	10′=10′	Dist by oblique transit= 8″.67................	......	610
5343	22 25 26.1	132 38 51	52.7	3	10 10′+	Neat....................................	......	728
5344	22 25 43.7	129 35 57	173.1	4	8 11	Very neat star..........................	L.9177	737
5345	22 26 4.9	95 55 17	207±	10	9′ 10	....	......	739
5346	22 26 59.9	122 32 56	32.4	100	7 8	A fine object	B.7185	495
	61.4	32 13	290±	12	7′ 15	The preceding of two bright st, very difficult	Δ. 241	494
5347	22 27 48.9	125 14 21	28.4	10	9 12	....	......	493
	49.6	14 49	27.2	7	9 12	....	......	492
5348	22 28 0.3	149 41 25	273.2	3	9 12	Pos 273.8, 272.6; very neat	......	735
5349	22 28 38.0	143 34 6	117.3	30	7 12	.... M. 10473	B.7187	500
5350	22 28 45.8	178 51 36	120±	20	6′ 12	Excessively ill defined	......	800
5351	22 29 4.2	138 29 40	340.3 209.8	5 3	10 10 10 12	Triple	......	496
5352	22 29 11.4	135 54 35	272.3 253.1	8 20	9 { 13 9′	....	......	490
5353	22 29 14.7	170 44 35	119.9 240.8	15 35	9 10 9 10′	Triple	......	623
5354	22 29 29.9	148 42 41	76.4	30	8′ 9	Δ R A = 4ˢ.0	......	470
5355	22 29 30	104 59 —	......	..	8, 8′, 9	Class 4, zone review	......	E
5356	22 30 17.6	119 13 32	59.2	2	8 10	Elegant; has a ✻ 6 m 2ˢ.5 p, and about 100″ n, which with this constitutes the coarse double star Δ. 242.	B.7190 +7191	475
5357	22 31 53.4	148 43 6	143.2	12	9′ 12	....	......	470
5358	22 33 30.9	151 1 4	89.8	30	8 10	Δ R A = 4ˢ.5..............................	L. 9217	501
5359	22 35 59.0	94 52 25	68.3 336±	20 20	9 9+ 9 12	A B A C Triple	Σ. 2937	739
5360	22 36 0.0	149 36 41	90.0	7	9′ 10	Exactly in the parallel	......	470
	0.1	37 27	88.8	12	9′ 12	....	......	735
5361	22 36 2.0	156 26 39	......	...	6 11	Class 6..................................	L. 9227	731
5362	22 36 35.7	137 49 40	140.2	8	8 11	Pos. 141.4, 139.0	B. 7208	496
5363	22 38 12.1	125 56 34	285.9	10	9′ 10	....	......	493
——	22 39 4.1	95 6 20	245.3	4	7 = 7	A third 10 m, dist about 60″	Σ. 2944	739
5364	22 39 52.0	147 24 14	98.0	12	10 10′	....	......	735
5365	22 42 6.4	126 47 1	270±	3	6′ 13	Very delicate	L. 9282	484
	....	46 ±	272.8	2	7 14	Pos 271.4, 274.3, difficult, and not well defined (past merid.)	......	637

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5366	22 42 45.0	133 41 36	254.0	15	8 9	....	......	728
	45.4	41 19	254.1 114.1	10 10	8 8′ 15=15	A B } C D } A bright and faint pair of double stars	......	489
5367	22 43 2.1	123 46 35	275.0	$2\frac{1}{2}$	5 9	Pos 274.3, 276.3, 274.4, the last with 320, and Δ. which it does not bear being tremulous.	A. 2728	493
	4.9	46 22	265±	$2\frac{1}{2}$	5 8	(22 Piscis Australis) too ill defined for measurement	......	492
5368	22 43 55.8	175 25 46	126.5	8	9 9	....	......	800
	....	26 —	125.9	10	9′=9′	Pos mean of 125.6, 125.3, 126.7	......	796
5369	22 46 55.6	163 12 26	11.8	20	10′ 11	....	......	625
5370	22 47 38.9	152 5 30	136.8	15	10 11	....	......	726
5371	22 48 32.5	117 0 17	346.4	5	9 10	....	......	474
5372	22 49 9.4	144 16 27	301.9	15	9 11	....	......	500
5373	22 50 ±	155 11 ±	99.6	48.9	7′ 10	Epoch 1836.569..............................	B. 7232	E
——	22 50 52.4	95 15 55	288.7	8	9′ 10	....	Σ. 2964	739
5374	22 51 0.4	164 12 1	58.1	10	10′=10′	....	......	625
5375	22 51 27.1	167 14 4	121.7	4	11=11	....	......	627
5376	22 52 39.6	162 17 47	351.0	5	10 11	Neat star....................................	......	625
5377	22 52 39.9	158 22 49	270.8	6	10 11	....	......	610
5378	22 52 49.2	173 18 50	343.1	35	9′ 9′	Pos 343.0, 343.3............................	......	633
5379	22 53 17.0	147 11 6	330.5	8	9′ 9′	....	......	470
	22.5	12 33	329.5	12	9′ 10	....	......	500
	24.8	12 24	325.6	20	9′ 10	Pos 326.0, 325.2; 330.5 tried, but declared unbearable.	......	735
5380	22 54 2.9	158 21 46	93.1	12	10′ 11	....	......	731
5381	22 54 50.7	165 55 39	48.8	3	10 10′	Pos 49.7, 47.3, 49.3; very neat	......	627
5382	22 55 2.5	142 16 2	51.5	7	9′=9′	Neat star....................................	......	730
	3.8	16 15	45.2	8	9′=9′	Neat..	......	498
5383	22 55 55.3	125 28 10	128.2	8	9′ 10	Ill defined	......	492
——	22 57 22.9	141 36 6	259.4	10	7′ 8	Very fine ✱; Pos 259.1, 259.7	B.7246	498
	23.7	36 7	264.5	10	6′ 7	Pos 264.4, 264.7. [N.B. Examined the adjustment of the micrometer and found all right. The star has surely changed if my former position was at all correct.]	=Δ246	730
5384	22 57 55—	105 53 —	......	..	8′ 9	Class 3. Zone review	......	E
——	22 58 17.9	150 38 48	292.1	12	8 11	....	Δ. 245	726
	....	...	285.3	12	8 10	Viewed 2 or 3 fields past meridian	L.9372	501
5385	23 0 11.9	169 15 40	337.9	25	8′ 11	....	......	623
5386	23 1 41.2	116 13 45	80±	10	10 10	Pos estimated from diagram	......	733
5387	23 4 0.9	131 52 14	277.9	12	8′ 10	....	B.7260	737
	6.3	51 26	278.3	8	8 10	....	......	489
5388	23 4 4.9	171 20 33	125.2	10	8 12	Pos 125.5, 124.9, neat star	B.7259	633
5389	23 5 2.2	158 6 6	253.5	8	8′ 12	Dist by obl trans = 7″.34—Pos misread 180° giving 73.5, which the diagram contradicts. A mean pos used in calculating the oblique transit.	......	610
	3.0	5 40	246.1	9	8 13	A pretty object	......	731
——	23 5 10.7	99 51 26	176.1	30	8′ 9	....	Σ.2993	740
——	23 6 58.5	100 1 10	310.7	60	5′ 10	....	σ. 776	740
5390	23 7 9.2	135 24 24	12.8	15	6 12	L single 480 and Δ............................	L.9419	490
——	23 7 55.8	151 55 50	......	..	8 8	Class 5. Δ. 247 =	L.9423	726
5391	23 8 34.4	126 59 14	341.0	12	9′ 10	A ✱ 9 m precedes. (Micrometer deranged)	......	484
	42.1	58 7	339.4	15	10 10′	The R A not to be relied on, as this ʃ cannot be exactly reduced for want of zero stars.	......	637
5392	23 8 35.7	149 13 52	17.3	12	8 10	Pos 17.3, 14.3, 17.3; (14.3 rejected)	B.7270	735
	38.0	14 11	19.4	8	8′ 10	In the field with γ Tucanæ	......	504
5393	23 9 18.8	115 56 50	312.7	15	9 10	....	......	733

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5394	23 10 35.7	96 3 6	26.3	10	6 14	(96 *Aquarii*), very delicate	A.2783	739
——	23 11 11.7	141 14 25	209.3	20	6 10	Pos 210.3, 208.3..............................	B.7276	497
	14.8	14 2	206.6	18	7 10	Pos 207.3, 205.9..............................	Δ. 248	498
	15.3	14 15	209.5	15	7 9	Pos 208.9, 210.1. Fine ✱	......	496
	15.4	13 37	207.4	20	7 9	Pos 207.1, 207.7. Dist by oblique transits = 13″.03. [N.B. The obs of this oblique transit is irregularly entered; there is either some mistake in the setting of the wire, or it had been moved in the act of observing.]	......	730
5395	23 11 40.3	128 37 58	218.8	3	8 10	Very elegant ✱. ? Position, the micrometer being deranged.	......	484
	41.9	36 25	222.3	3	8′ 10	Pos 226.5 (rejected) 222.8, 221.8; a very elegant double star.	......	636
	42.3	37 2	219.0	..	......	Pos 219.9, 218.8, 218.3. Tried 226.5 the first measure of ʃ 636. It is evidently a mistake of 5° in the reading of the micrometer.	......	637
5396	23 13 11.1	137 56 45	153.5	6	10 11	....	......	490
——	23 14 55.3	99 23 46	90.5	8	9 = 9	Neat star	Σ.3008	740
5397	23 15 —	105 25 —	330.0	61.8	7 9	Epoch, 1835.761	......	E
5398	23 16 25	108 10 —	......	..	......	Class 3. Zone review	......	E
5399	23 17 28.3	172 3 1	90.8	12	11 = 11	Δ R A = 6ˢ.5	......	633
5400	23 20 9.9	165 4 5	179.3	18	7′ 13	....	L.9487	622
5401	23 20 28.5	145 14 52	40.0	10	10 10	....	......	629
——	23 20 50—	108 11 —	......	..	10 10	Class 2. Zone review	h. 3197	E
5402	23 22 16.9	160 0 12	199.8	35	8′ 10	....	......	616
5403	23 25 —	155 38 —	48.4	42.3	7 10	Mean epoch, 1836.017	B. 7301	E
5404	23 25 56.3	120 17 23	304.7	15	10′ = 10′	....	......	494
5405	23 26 22.5	127 48 32	80.7	5	10 11	Micrometer derangement corrected	......	484
5406	23 26 22.8	170 58 59	34.8 351.3	15 20	9 13 9 13	Triple	......	633
	25.4	59 10	38.2 353.1	18 20	9 12 9 12′	Triple	......	623
5407	23 26 45.6	155 1 47	24.6	7	9 9′	Extremely ill defined..........................	......	505
5408	23 27 19.7	140 35 40	313.1	3	12 = 12	In a very poor region..........................	......	497
5409	23 27 25.3	161 45 2	323.3	7	11 11′	....	......	616
	26.2	45 17	325.3	5	10′ 11	Beautifully defined and tranquil	......	513
5410	23 30 11.4	114 39 15	70±	8	10 12	The following and less of 2	......	733
5411	23 30 12.6	93 1 58	32.7	15	9′ 10	....	......	739
——	23 30 20.4	137 34 44	270.0	3	8′ 9	(θ *Phœnicis* = Δ 251 = R 27)..................	B.7314	497
5412	23 30 31.9	121 34 38	57.2	16	9 10	....	......	494
5413	23 32 55±	108 43 ±	......	..	5′ 7	Class 5. Zone review	......	E
5414	23 33 7.7	168 44 40	262.7	8	8′ 10	....	......	623
5415	23 33 26.7	161 46 14	117.3	40	6 11	Points exactly to a 3d = 11′m..................	L.9562	625
5416	23 34 0.7	137 15 28	217.7	35	6 11	....	L.9565	490
5417	23 35 32.3	117 11 55	326.9	8	6′ 9′	Fine ✱, and good measure........................	M.10865	733
5418	23 36 42.5	135 35 29	134.1	4	8 12	....	......	490
5419	23 36 50.4	162 54 42	95.9	18	10 = 10	Pos 95.1, 96.7; Δ R A = 5ˢ.0	......	482
——	23 37 11.1	109 37 43	138.2	7	6 8	107 *Aquarii*. A fine double ✱, but ill defined. Measured after meridian by recalling the star by the collimating screws and reins, a great convenience.	A.2836 σ. 786	741
5420	23 37 11.4	144 13 7	45.0	4	9′ 11	....	......	629
5421	23 38 18.2	145 32 12	49.3	8	11 11	....	......	629

No.	R A. 1830.0. h. m. s. d.	N P D. 1830.0. ° ′ ″	Position.	Dist.	Magnitude.	Remarks.	Synon.	Sweep.
5422	23 40 32.7	134 24 27	349.7	4	9′ = 9′	*Nisi* R A = 23 41 16.1; Pos 349.8, 349.7. The last measure taken with power 1200 with 12 inches aperture, with which power it is seen with perfect distinctness and well defined.	......	489
	33.2	24 47	351.7	3	9′ 10	*Nisi* R A = 23 41 16.7; Pos 352.7, 350.8. [N.B. *In one or other observation the wire has been mistaken, and on reducing both on either supposition, the point remains equivocal. The earliest R A is therefore set down, as usual in such cases.*]	......	728
5423	23 41 0.2	116 17 0	313.8	15	6′ 15	Very delicate; good measure	......	733
5424	23 41 11.2	146 49 26	50.7	10	9 12	....	......	504
	11.4	49 23	57.4	6	9′ 11	....	......	500
	....	....	56.3	5	11 12	Viewed and measured........................	......	732
5425	23 41 16.0	152 3 16	275.1	10	11 11	A star 7′ m 4′ s p	......	726
5426	23 43 41.7	135 26 1	317.7	8	9 11	....	......	490
5427	23 44 13.1	163 7 31	64.0	8	9 = 9	Pos 63.5, 64.5; elegant star	......	625
5428	23 44 32.7	156 53 54	115.5	12	7 14	Very delicate	B.7341	731
5429	23 44 55.7	120 20 43	221.3	25	7′ 10	L yell, S blue	......	494
5430	23 45 29.5	167 44 36	49.3	12	9′ 10	Δ R A = 4^s.5	......	622
5431	23 45 41.1	142 30 45	146.6	25	9 10	....	......	498
5432	23 46 17.4	149 40 58	32.6	20	9 9′	R A unsatisfactory for want of sufficient fiducial stars in this *ſ*.	......	502
	21.2	41 55	41.4	25	9 9′	Pos 40.7, 42.1..............................	......	735
5433	23 46 57—	108 42 —	......	..	10 10	Class 3. A star 7 m precedes	......	E
5434	23 47 11.2	161 48 21	47.9	12	8′ 12	....	......	625
5435	23 48 —	107 6 —	2.7	12:	9 9′	Epoch, 1835.761. Nisi P D = 107° 1′	......	E
5436	23 50 27.7	152 0 23	274.8	20	9′ 12	....	......	736
5437	23 51 42.3	144 2 17	297.6	2	5′ 11	Very difficult. Seen only by glimpses, being ill defined. Must be re-examined.	......	629
	47.7	2 28	293.6	3	6 14	A most delicate and beautiful object. The night will not bear magnifying, but the small star perfectly well seen, and no doubt remaining.	......	732
5438	23 51 56.3	148 10 18	322.7	4	9′ 14	Very delicate	......	502
5439	23 53 25.6	163 34 31	86.3	5	10 13	....	......	625
	25.9	34 12	87.1	4	9 13	....	......	482
5440	23 54 —	118 4 —	285.1	3.6	8′ 9	Epoch, 1834.780	......	E
5441	23 57 10.1	112 36 6	223±	20	9 9	....	......	641
5442	23 58 58.1	168 25 55	63.9	20	8′ 11	....	......	623
	60.6	26 25	60.4	25	7′ 12	....	......	628

DOUBLE STARS ACCIDENTALLY OMITTED PREVIOUS TO NUMBERING THE GENERAL CATALOGUE.

5443	6 36 —	130 11 —	104.5	17.2	9′ 10	....	B.1318	E
5444	10 32 44.3	171 2 8	230.3	40	6 8	A third makes a triangle	B.3137	549
5445	14 29 —	144 12 —	70.1	20	9 10′	....	......	E
5446	17 20 44.1	98 16 9	91.3	15	9 10	....	......	609
5447	19 42 52.6	144 31 56	273.6	5	10 11	....	......	710
5448	22 38 29.9	128 55 2	205.1	10	9 13	....	......	637
5449	23 46 9.0	160 16 37	349.6	4	10′ 11	Near star..................................	......	510

INTRODUCTION TO THE MICROMETRICAL MEASURES OF DOUBLE STARS.

(156) The instrument with which these measures were executed was the same with that employed in all my previous measures of the same nature at Slough; nor, excepting a change in the length of its polar axis necessary to adapt it for a different latitude, was any alteration introduced in the mode of mounting it. The elevated extremity of the axis rested, as formerly, in a strong iron Y, projecting as an arm somewhat curved from the summit of a wooden post very firmly planted in the ground, so as to allow room for the person of the observer between it and the eye-piece when the telescope was directed horizontally. The lower end, carrying the hour circle, with the necessary sliders for adjusting the axis in altitude and azimuth, rested on a wooden block bedded on a pier of brickwork laid in cement. The movement necessary for following a star in the act of measurement was communicated as previously, not by a clock-work mechanism, but by a screw movement worked by a long handle and Hook's joint.

(157) The building in which this instrument was placed was circular, consisting of a wall seven feet eight inches high from the floor, with a recess on the north side for receiving the pier, and a door-way on the west. Its internal diameter was 9 feet 4 inches, and on the top was bedded a wooden circle of $4\frac{1}{2}$ inches in thickness by 7 in breadth, supporting and held together (so as to break joints) by a cast-iron circular rail whose section is represented in fig. 5, Pl. XII., the projection being destined to carry the rollers of the revolving roof; and forming, when laid down and screwed fast on its bed, a circle of 10 feet 6 in. diameter from summit to summit of the projecting part.

(158) The revolving roof itself consisted of a square horizontal frame of fir timber, five inches in thickness and breadth, mitre-cut, and joggled together at the angles, and bolted firmly together by stout iron screw-bolts, which, besides drawing the joggles into close fitting, served another purpose in reference to the connection of the frame with the superstructure, to be more fully explained further on. On the under side of each of the four beams composing this frame and in the middle of its length was fixed a cast-iron shoe, carrying an axle and roller, as seen in section in fig. 4, Pl. XII. The form of the shoe is shown in perspective in fig. 6, and in lateral projection in fig. 2. The construction of the axle is shown more particularly in fig. 8. The portion C is squared, to prevent its turning in the corresponding square aperture of the shoe, wherein it is secured by the screw D, and the cylindrical portion

A, outside of the shoe, which carries the roller, is somewhat larger in diameter than the inner portion B, abutting with a shoulder on the outer face of the shoe. These figures sufficiently explain the structure and adaptation of the parts; and it is only necessary to mention, that the rollers are all situated on the *inside* of the frame, which in consequence overhangs and entirely includes the circular rail-way, as shown in fig. 1.

(159) It is manifest that a square frame simply so constructed and supported would not maintain itself with any constancy in one plane. Two of its opposite corners would inevitably rise, and the other two sagg down with every accidental inequality of pressure. Stiffness must therefore be given by the superstructure. The mode in which this is effected will be best understood by inspection of fig. 1, Pl. XII., which is a perspective representation of the framing of the roof, supported on its rollers on the railway. From the corners of the horizontal frame rise four "hips" or planks of deal somewhat tapering upwards, and at their lower ends cut so as partly to rest upon, partly to abut into the corners of the frame, as shown in fig. 7. These hips meet at the top, where they are all four connected together by a cross of iron, whose arms are bent down and run along their under edges, to which they are strongly screwed. They form, therefore, the four oblique edges of a quadrangular pyramid, resting on and abutting into the corners of the square base. It follows, then, that no two opposite corners of that square can rise without forcing up the vertex of the pyramid by the hips resting upon them, and thus carrying up the alternate ones off their bearings. To counteract this effect, and to prevent the rising of these latter, or, which comes to the same thing, the relative sagging down of the corresponding corners of the frame, a strap of iron, turned up at its lower end into a hook, is made to seize the cross-bolt uniting the beams at the corner, and is then screwed firmly along the under side of the hip, as seen in fig. 7; which done at all the corners, a pushing and pulling connection of the square base with the oblique sides and vertex of the pyramid is effectually established, and the whole pyramid rendered perfectly stiff and unchangeable in form.*

(160) The vertex of the pyramid is purposely made to correspond perpendicularly over a point not in the centre of the square base, but 20 inches nearer one side of the frame than the other, without which it would be impracticable to observe in the zenith. In consequence, one of the faces of the pyramid slopes materially more than the other; and in this more sloping face is the opening, 18 inches wide, closed by two doors folding back on hinges, and overlapping each other with grooves and splash-boards to carry off rain. The rest of the framing of the roof is sufficiently shown without further explanation, in the perspective view, fig. 1, and in projection in fig. 3, where the dotted circle represents the projection of the spherical surface described by the eye-piece of the telescope when directed to every point of the heavens in succession, that being rather the longer end of the tube when mounted in its bearings.

(161) A light boarding and painted canvass completes the covering of the pyramid.

* In the whole structure of this roof the object has been to avoid crippling and destroying the strength of the timbers and planks by cross cutting and mortising, a practice in carpentry which (in its lavish and too common use) cannot be too strongly reprobated. With exception of the four corner bolts which are indispensable, small wood screws alone interrupt the continuity of the woody fibre throughout the whole structure.

Beneath the square frame, the corners also, where they project beyond the wall, are boarded; and a circular skirt board carried down below the level of the iron rail-way, but not quite into contact with the wall, and outside of the wooden ring on which the rail-way is bedded, excludes both wind and rain beneath. The whole structure is so light that it might be apprehended that the violent winds prevalent at the Cape would carry it away, especially if gaining admittance beneath it. But the pressure downwards, arising from the slope of its exposed surface, more than suffices to counteract any such lifting tendency; nor in point of fact did any accident of the kind happen even during the most violent gales, after a precaution at first employed of tying down the corners by ropes to posts fixed in the ground had fallen into habitual neglect from experience of its needlessness. The ropes were therefore removed all but one, which served to drag round the roof into its proper situation, no provision having been made for turning it from within.

(162) In the measurements executed with this instrument, the same micrometer (a parallel thread revolving micrometer by Troughton and Simms) which had served for my former measures was retained, and the same set of eye-pieces as heretofore (of 79, 179, 273, and 400 magnifying powers). A "macro-micrometer" eye-piece, by Dollond, was provided, and a few measures taken with it; but its performance, though satisfactory, was not so decidedly superior to that of the ordinary double eye-pieces as to induce me to persevere in its use to their exclusion; and no table for the reduction of its measures having been formed, the few measures in which it was employed have remained unreduced. As respects the micrometer itself (which remained unchanged, whatever eye-piece was used), its readings of position are and always have been unexceptionable, and on the positions measured with it I have the fullest reliance. But as regards the distances, I lament to be compelled to state that the case is far otherwise. The inherent defect of the instrument (a very costly one), that of the *hitching* of the parallel spider's threads in the act of crossing, could never be fairly overcome. It was in vain that, previous to quitting England, it was placed in the maker's hands for the express purpose of remedying this annoying evil. For a while, indeed, it performed satisfactorily, but the mischief soon recurred, and grew at length so obvious a source of error that already in October, 1834, I began occasionally to substitute for the system of measures by cross zeros, with the spider lines, that of an absolute zero, with one-sided measures between the inner edges of two thick parallel wires which had been added to the system of wires in the micrometer, and which could be brought into the centre of the field by the screws, to the exclusion of the spider threads. This, it is obvious, is a far less eligible mode of measurement — the thickness of the wires precluding all certainty of the bisection of the stars by their edges, and introducing a difference between the measures of large and small stars depending on their brightness; add to which, a parallactic error is introduced, which can only be eliminated by empirical processes, and which, in fact, proved the source of a vast deal of trouble and of much and obvious error. Still the evil increasing with the spider threads, after vainly attempting to correct it myself, on the 9th April, 1835, they were condemned as useless, and soon afterwards removed (April 13). From this time until June 3, 1836, the thick wires alone were used in the measurement of distances. Then, however, by the kindness of Mr. Maclear, the micrometer was refitted with a pair of beautifully even and delicate threads of the Bermuda spider, which he was

so good as to fix and adjust with his own hands; but the hitching being thus only partially remedied, on the 27th June, 1836, these were again removed by him, and their places supplied with another pair more cautiously applied. These went on very well for some time; but on April 27, 1837, the hitching was again remarked, and from this time to the conclusion of my observations continued a more or less frequent source of annoyance. So long as the evil in question is confined (as it usually was) to a mere temporary adhesion of the threads in the act of crossing, it may be presumed indeed that their elasticity will at once restore them to their right places, and that no *material* change of zero would arise; and this really does appear to have been the case, on examining the + and − readings in a great many instances. There is, however, no *security* that it shall be so; and where, as has occasionally happened, the wires *drag* in their motion, though *not* crossing, and move by visible jerks, all confidence is destroyed, and error to an unknown amount must be expected to arise.

(163) The measurements of distance taken with the thick wires, when compared with those observed with the spider lines, exhibit a disagreement evidently systematic, and one which it is of the utmost consequence to eliminate, in order that measures of the same double star taken by both methods shall become comparable with each other, and admit of a mean being taken. To this end all the cases in which measures of the same star have been actually taken have been collated, and the differences of the mean results of both methods being tabulated, an interpolating curve was constructed by the projection of the results on a chart of engraved squares, taking the distance as measured by the thick wires for the horizontal co-ordinate x, so that the vertical co-ordinate (y) shall represent the correction to be applied to reduce that measure to what it would have been had the spider lines been used. It is needless to give at length the details of this process, which is one purely mechanical; but the final result of reading off and tabulating the interpolating curve is presented in the following table:—

TABLE OF CORRECTIONS

To be applied to the MEASURES of DISTANCE taken with the thick wires and a fixed zero, to reduce them to comparison with those obtained with the spider lines and cross zeros.

Dist. Meas. ″	Correction. ″	Dist. ″	Corr. ″	Dist. ″	Corr. ″	Dist. ″	Corr. ″	Dist. ″	Corr. ″	Dist. ″	Corr. ″	Dist. ″	Corr. ″
2	0.0	18	+2.0	34	+3.0	50	+3.3	66	+3.4	82	+3.4	98	+3.1
3	+0.1	19	+2.1	35	+3.0	51	+3.3	67	+3.4	83	+3.4	99	+3.1
4	+0.3	20	+2.2	36	+3.0	52	+3.3	68	+3.4	84	+3.4	100	+3.1
5	+0.5	21	+2.2	37	+3.1	53	+3.3	69	+3.4	85	+3.4	101	+3.1
6	+0.6	22	+2.3	38	+3.1	54	+3.3	70	+3.4	86	+3.4	102	+3.1
7	+0.7	23	+2.4	39	+3.1	55	+3.4	71	+3.4	87	+3.3	103	+3.1
8	+0.9	24	+2.4	40	+3.2	56	+3.4	72	+3.4	88	+3.3	104	+3.1
9	+1.0	25	+2.5	41	+3.2	57	+3.4	73	+3.4	89	+3.3	105	+3.0
10	+1.1	26	+2.5	42	+3.2	58	+3.4	74	+3.4	90	+3.3	106	+3.0
11	+1.3	27	+2.6	43	+3.2	59	+3.4	75	+3.4	91	+3.3	107	+3.0
12	+1.4	28	+2.7	44	+3.2	60	+3.4	76	+3.4	92	+3.3	108	+3.0
13	+1.5	29	+2.7	45	+3.3	61	+3.4	77	+3.4	93	+3.2	109	+3.0
14	+1.6	30	+2.8	46	+3.3	62	+3.4	78	+3.4	94	+3.2	110	+3.0
15	+1.7	31	+2.8	47	+3.3	63	+3.4	79	+3.4	95	+3.2		
16	+1.8	32	+2.9	48	+3.3	64	+3.4	80	+3.4	96	+3.2		
17	+1.9	33	+2.9	49	+3.3	65	+3.4	81	+3.4	97	+3.2		

The corrections thus obtained have been applied to all the distances measured with the thick wires, as part of the process of their reduction; so that the results presented in the following measures are, so far as is possible, cleared of the peculiar sources of error which the use of this method introduces.

(164) The method of oblique transits* is altogether free from this and from every other source of systematic error; and, except that it is liable to be occasionally defeated by the accidents of variable refraction, is wholly unexceptionable. A great many of the distances have been obtained by this method; and when this has been the case it is noted in the appended notes, which contain, besides, a variety of miscellaneous remarks on circumstances affecting the probable exactness of the measures both of position and distance—on the distinctness of vision and performance of the telescope as affected by atmospheric changes, and a number of other particulars—all noted at the time of observation (except in a few cases where the contrary is expressed).

(165) In the measures as originally set down, every individual measure, whether of position or distance, has a weight attached indicative of the estimated reliance to be placed on the measure. These weights vary from 1 to 10 to each measure. In my former published measures the sums of these weights have been set down, with the mean results. But as, in taking the mean results of several sets of measures, the use of these weights entails a vast amount of arithmetical computation, without the advantage of any really increased precision in the result sufficient to repay the trouble thus caused, I have thought it advisable, in presenting these observations to the public, to adopt a system, intrinsically quite as good, and greatly facilitating the calculation of general means. It consists in substituting for the total or joint *weights* of each night's observations, classificatory numbers or simple numerical values expressed in lower numbers, 1, 2, 3, 4, and in a few rare cases 5. The system on which these are assigned is this:—If the sum of the weights in a set of measures be below 15, the result is considered as entitled only to the lowest unit of value—as decidedly an inferior and unsatisfactory result. If 15, and below 35, the value 2 (expressive of a fair and average degree of reliance) is assigned; if 35 and below 55, it is classed as decidedly good, and valued as 3; above 55 and below 85 (cases occurring usually in favourable conjunctures, and not frequent), the value assigned is 4; while to the very few sets in which the total weight exceeds this limit, and on which particular pains had been bestowed, and a greater than usual number of measurements made, the value allowed is 5. This done, the operation of

* Let p be the polar distance of a double star; θ its measured angle of position reckoned as usual from 0° to 360° in the direction *nfsp*; a the angle of position of an oblique wire across which both the stars are allowed to transit by their diurnal motion; Δ the interval of their transits across it in seconds of time. Then will the distance of the stars from each other be given by the formula

$$\delta = \frac{15''.\ \Delta.\ \sin \text{p}.\ \cos a}{\sin (a - \theta)}.$$

Convenient valves of a are 100° or 110°, or (on the other side of the vertical) 260° or 250°. Those most commonly used were 100° and 260°. The inclination of the oblique wire ought to be towards the opposite side of the meridian to that of the line joining the two stars. In situations not remote from the pole, a high degree of precision is attainable by this method.

taking the general mean of several nights' measures is reduced to involve only multiplications by a single figure, and therefore most materially alleviated; while, from the extreme vagueness which necessarily attaches to such numerical estimates of the weight or value of any individual observation or any assemblage of such, it is obvious that no sacrifice of ultimate numerical precision at all worth considering is induced; or rather, that the one process is quite as well calculated to lead to final accuracy of determination as the other. Individual measures are in no case given, except under some remarkable circumstance, or if, as sometimes happens, only a single measure was procured. To have done so would have entailed an immense mass of printing without any corresponding advantage.

(166) Appended to the micrometrical measures here registered as the results of single night's observations, is a synoptic view of their general mean results reduced to mean epochs. In calculating these, not only the positions and distances, but also the epochs of each, are derived from the use of the assigned values attached to them in the general register, and the sums of these values are appended in columns of their own to both the elements, as the representatives of the *relative* values of the several results. In the case of stars of whose binary connection there can be no doubt, not only the general mean angle of position with its mean epoch is stated, but, for convenience of future reference, sub-epochs are calculated for each year of the interval over which the observations extended. The same has also been done in the case of one remarkably close double star (γ Lupi), whose binary character is not apparent, by reason of the great discordance of its measures (arising from its closeness). In the case of γ Virginis the general epoch has not been calculated, owing to the extraordinary velocity and excessive inequality of its angular motion in perihelio, which make such a calculation useless.

Micrometrical Measures of Double Stars with the Seven-feet Equatorial, taken at Feldhausen, Cape of Good Hope, in the Years 1834, 1835, 1836, 1837, and 1838.

Index No. for Reference.	Synonyms.	R A. 1830.0.	N P D. 1830.0.	Position with Meridian from N by W.	Value attributed.	Dist.	Value attributed.	Magnitude.	Date of Observation. 1800+
1113	h. 1944	0 5	108 6	346 24	3	68.25	2	7′ 8	35.832
1114				344 59	3	......	..	8 8′	36.830
1115				345 45	2	67.65	2	7′ 8′	36.895
1116				346 3	2	66.21	2	7′ 8	36.914
1117				......	..	68.24	2	......	36.914
1118	Δ. 1. β Toucani	0 24	153 54	173 44	3	28.25	4	5 5	34.849
1119				171 15	4	27.12	4	......	34.928
1120				172 8	3	29.43	2	5 = 5	35.583
1121				......	..	26.27	1	......	35.583
1122				172 4	3	27.31	4	4′ = 4′	37.739
1123	ξ Apparatus	0 25	125 55	164 33	3	7.04	1	6 9	34.717
1124				164 31	3	6.23	2	6′ 8	35.580
1125				163 8	2	6.30	1	7 10	35.917
1126	h. 3376 = B. 64	0 26	146 16	247 21	3	7.74	2	6 11	36.958
1127				247 53	2	7.45	2	7 11	37.739
1128	h. 3395	0 38	132 50	62 40	2	......	..	9 9	34.693
1129				62 50	2	10.46	1	8 8′	35.583
1130				63 25	2	8.45	3	8′ 9	37.739
1131	Δ. 2; λ Toucani; R. 1	0 46	160 26	78 30	3	20.46	2	6′ 7	35.920
1132				79 33	3	19.50	1	7′ 8	36.711
1133				......	..	22.65	3	......	36.711
1134				80 51	4	20.97	1	......	36.750
1135				......	..	21.89	1	......	do
1136				......	..	23.51	3	......	do
1137				80 35	3	20.94	3	6′ 8	37.739
1138	σ. 17	0 50	106 34	32 42	2	6.27	1	7′ = 7′	35.717
1139				31 35	3	7.06	1	7 7	35.832
1140				32 43	3	6.65	3	7′ 7′	37.797
1141	h. 3416	0 56	151 0	126 17	3	5.26	2	8 8	34.772
1142				126 38	3	4.63	1	8 8	36.711
1143				......	..	5.26	2	......	do
1144				127 23	3	5.58	4	7′ = 7′	36.958
1145	B. 156. ζ Phœnicis; R. 2	1 1	146 9	244 0	2	6.73	1	5 10	34.772
1146				243 58	3	5.81	1	6 11	36.641
1147	Σ. 110	1 9	103 12	352 42	2	8.05	2	8′ 9	37.797
1148	B. 178; κ Toucani	1 10	159 47	17 50	3	5.78	1	5′ 11	36.641
1149				14 20	2	4.24	2	6′ 10	36.914
1150	h. 3426 = B. 180	1 11	157 18	346 8	1	2″±	0	7 11	35.583
1151				348 15	2	2.52	1	6 9′	37.739
1152	h. 2036	1 12	106 41	45 0	1	$1\frac{1}{4}$	0	8′ 9	35.717
1153				38 3	2	1.82	2	8′ 8′	36.958
1154	h. 3437 = λ. 2690	1 20	108 9	243 56	2	14.24	1	7 9	35.772
1155				246 24	2	12.58	3	7′ 10	36.925
1156	h. 3447 = B. 227	1 28	120 47	75 49	3	3.65	1	6′ 7′	36.641
1157				75 8	2	3.04	3	5′ 7	37.802
1158	Δ. 4 = L 489	1 32	144 18	103 57	3	10.50	1	7′ 8	35.914
1159				105 17	3	10.42	1	7′ 8′	36.646
1160	Δ. 5 = p, 6, Eridani	1 33	147 3	122 20	3	3.39	4	7 = 7	34.772
1161				124 12	2	......	..	......	34.849
1162				122 20	3	3.92	4	7 = 7	34.928
1163				120 25	2	3.75	2	6 = 6	35.583
1164	Σ. 147	1 33	102 7	86 55	3	4.65	2	6 8	37.797
1165	h. 3461. — ε Sculptoris	1 38	115 54	69 13	2	5.82	1	6 10	35.906
1166				69 45	3	5.43	3	6 10	36.958
1167	h. 3469 = B. 260	1 42	129 12	70 53	1	$2\frac{1}{4}$	0	6 10	37.808
1168	h. 3475	1 50	151 8	38 47	3	3.37	4	7′ 7′	36.958
1169				36 31	3	3.32	2	7 7	37.802
1170	h. 3484	2 2	120 27	63 32	2	89.16	1	8 9′	37.011
1171	h. 3488	2 7	152 27	134 56	2	4.93	1	8′ 9′	34.772
1172				134 43	2	6.28	2	9 9′	36.914
1173	h. 3504	2 23	121 7	267 52	1	6.49	1	8 8′	35.906
1174				269 28	2	8.34	2	9 10	36.958
1175				267 20	1	7.09	2	8 9	37.802

Index No. for Reference.	Synonyms.	R A. 1830.0.	N P D. 1830.0.	Position with Meridian from N by W.	Value attributed.	Dist.	Value attributed.	Magnitude.	Date of Observation. 1800+
1176	h. 3506, ω Fornacis	2 26	118 59	244 8	2	9.75	2	6 9	34.780
1177				241 8	3	11.95	3	5 7′	35.906
1178				240 40	3	11.16	3	5′ 8	37.802
1179	h. 3510	2 28	133 44	10 55	2	4.33	0	9′ 10	36.641
1180				7 12	1	4±	0	9′ 10′	36.958
1181	B. 379 + 380	2 32	135 27	7 35	3	97.26	3	7′ = 7′	36.841
1182	h. 3523	2 35	120 17	94 44	2	61.55	3	8 8	37.011
1183				......	..	66.32	1	......	do
1184	h. 3526 = B. 389	2 36	121 48	56 35	1	15±	0	7 11	34.780
1185	h. 3527 = B. 395	2 37	131 15	41 56	2	1.90	1	7′ = 7′	35.920
1186				46 7	2	1.41	2	8 = 8	36.841
1187				42 18	3	1.39	4	7 7	37.019
1188	B. 394 (marked double in B)	2 37	116 15	184 55	2	10.39	2	6′ 9	34.780
1189				185 23	2	11.68	3	6′ 9	37.802
1190	Δ. 8	2 51	115 40	221 27	3	28.62	2	7 7′	35.903
1191	Δ. 9, B. 446, θ Eridani..............	2 52	130 59	81 19	3	8.27	3	4′ 6	34.928
1192				80 53	3	8.96	1	......	35.903
1193				82 42	2	......	..	5 6	35.911
1194				81 39	2	9.16	2	4 6	36.841
1195	Δ. 10; B. 473......................	2 58	141 59	70 42	2	37.31	2	7 8	37.945
1196	B. 493; 12 Eridani	3 5	119 40	310 4	3	5.19	2	3 7	35.870
1197				307 25	1	......	..	5 10	35.903
1198				311 15	2	5.42	2	3′ 9	36.925
1199	h. 3562............................	3 9	154 57	328 47	3	48.38	2	8′ 9	36.901
1200	h. 3565............................	3 11	109 6	109 27	2	5.77	1	5′ 9	35.758
1201				111 27	2	......	..	5 9	35.870
1202	Δ. 12 = B. 529	3 12	155 4	101 49	3	18.09	1	7 9′	35.914
1203				102 53	3	20.51	2	7 9′	36.901
1204	h. 3576	3 19	136 14	341 30	2	4.75	1	7′ 9	36.006
1205				333 25	1	4.25	3	7 10	36.901
1206				340 25	3	3.61	4	7 9	37.019
1207	B. 551. h. 3575....................	3 20	141 40	42 22	3	36.91	0	......	34.772
1208				41 45	3	31.55	1	7 10′	35.914
1209	B. 583 = Δ. 15 = 184 (Bode) Erid	3 34	130 55	326 53	2	8.58	2	8 9	34.928
1210				325 42	3	8.74	2	7 8	35.903
1211				326 23	2	8.59	1	6′ 7′	36.003
1212				327 29	3	9.54	1	7′ 8′	36.865
1213	Δ. 14 = B. 586	3 35	150 20	270 33	2	54.89	0	7′ 8	34.772
1214				269 25	3	59.28	1	7′ 8′	36.838
1215	h. 3589	3 38	131 12	344 48	2	6.58	2	7 11	37.068
1216	h. 3592	3 40	144 48	11 24	3	5.58	2	6 10′	36.958
1217				11 8	3	6.38	2	6′ 10′	37.019
1218	Δ. 16. (f Eridani)................	3 42	128 9	199 17	3	9.06	2	......	35.906
1219				200 3	4	8.29	4	5 5′	36.914
1220	h. 3596	3 42	122 18	136 8	2	10.32	1	8 = 8	35.906
1221				136 30	3	10.11	4	......	36.925
1222	h. 3622	3 59	126 18	113 45	2	10.25	2	8 9	37.843
1223				110 55	1	10.52	1	9 9	38.082
1224	h. 3627	4 6	124 12	304 25	2	30.05	2	8 10	37.843
1225				302 15	1	29.26	1	8 10	38.082
1226	h. 3628	4 6	126 36	50 3	2	50.51	2	7 7	38.082
1227	h. 3632	4 8	120 30	160 37	2	9.73	1	7′ 9′	35.906
1228				163 15	2	11.64	2	8 10	36.988
1229	h. 3634	4 10	135 3	148 25	3	12.90	1	8′ 8′	36.006
1230				148 5	2	12.86	2	10 10	36.838
1231	h. 3641	4 13	152 37	289 37	1	6.90	1	5′ 12	36.958
1232	h. 3642	4 13	124 17	157 55	2	6.52	2	7 10	37.843
1233				157 20	2	5.29	3	6′ 10	37.945
1234	R. 3; θ Reticuli..................	4 16	153 40	6 5	3	5.53	1	5′ 9	34.772
1235				6 2	2	6.85	2	6 9	36.838
1236	B. 713; = R. 4....................	4 21	147 28	231 28	3	7.59	2	7′ 8	36.914
1237				232 8	3	6.86	4	7′ 8′	36.942
1238	h. 3650 = B. 712	4 21	130 55	184 9	2	4.76	2	7 9	36.901
1239				183 58	2	5.14	2	7 10	36.914
1240	h. 3664............................	4 28	115 23	189 41	2	22.42	1	7 11	37.953
1241	B. 744. α Doradûs	4 30	145 24	108 33	2	82.29	1	3 11	36.006
1242	h. 3677............................	4 34	119 54	170 51	2	9.94	1	9 = 9	35.906
1243				170 54	2	12.56	2	9 = 9	36.925
1244	h. 3678............................	4 34	135 22	327 15	2	40.55	1	8 10	36.006
1245				327 6	2	42.79	2	8 10	36.953

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1246	h. 3683	4 38	149 17	82 30	3	3.25	2	8 8	35.925
1247				79 58	3	4.20	3	8 = 8	36.884
1248	h. 3694	4 44	135 27	63 12	1	5.79	1	8′ 10	36.008
1249				61 25	2	......	..	7′ 10′	36.958
1250	h. 3702	4 47	115 26	222 35	2	21.61	2	9 10	36.925
1251	One or other P D 10° wrong	......	105 26	219 23	2	20.37	2	9 11	36.988
1252	Δ. 18 = B. 810 + 811; ι Pictoris	4 47	143 45	56 57	3	12.31	3	6 7	34.931
1253				58 47	3	12.43	4	5 6	35.016
1254	h. 3735	5 7	122 7	150 19	3	7.84	1	8 8	36.008
1255				151 27	2	7.47	2	8′ = 8′	36.988
1256	Rigel	5 7	98 24	200 7	3	9.40	2	1 9	35.049
1257				198 30	4	8.96	4	1 8	36.958
1258				200 43	3	9.89	4	1 8	37.088
1259	h. 3741 = B. 905	5 9	168 32	116 30	2	42.98	1	6 9′	34.945
1260				110 35	2	42.45	1	6 11	37.019
1261	h. 3745	5 12	124 12	168 18	1	15.63	0	7′ 9′	37.945
1262				165 8	2	11.42	1	7′ 10′	38.036
1263	σ. 170	5 12	108 42	17 57	3	38.99	3	7 7′	37.107
1264				18 0	3	39.07	4	7 7′	37.903
1265	h. 3751	5 14	123 34	319 44	3	24.72	2	8′ 10	37.077
1266				319 36	2	21.46	2	9 10	37.110
1267	h. 3752 = A. 641. A. and B.	5 15	114 57	111 32	3	3.27	5	6 ..	37.110
1268				108 25	2	3.43	2	6 9′	37.942
1269	A. and C.	......	......	106 49	2	56.22	1	5′ 9	36.925
1270				107 27	2	59.87	2	6 9	37.110
1271				106 58	2	59.28	1	6 9	37.942
1272	h. 3759	5 19	109 50	316 15	2	27.95	2	6′ 9	37.942
1273				314 35	3	29.63	3	6 9	37.945
1274				315 0	2	28.07	2	6 8	37.953
1275	h. 3760	5 20	125 30	222 18	1	7.09	1	7 7′	35.022
1276				220 57	3	7.55	1	7′ 7′	35.906
1277	Δ. 20; B. 961 + 962; θ Pictoris	5 21	142 28	285 51	3	39.36	1	6 = 6	35.914
1278				286 2	3	37.81	3	6′ 7	36.884
1279	h. 3767 = B. 973	5 25	137 13	223 26	2	26.44	0	6 10	35.911
1280				232 45±	1	18.00	0	6 12	37.920
1281	Δ. 21	5 25	137 13	264 5	1	197.15	1	6 7	37.920
1282	Δ. 22 = B. 976	5 26	132 26	171 35	3	7.98	2	......	34.931
1283				172 1	3	8.78	3	7 8	35.016
1284	h. 3777 = B. 994	5 30	145 1	349 20	1	51.82	1	6′ 9′	34.947
1285	ζ Orionis	5 32	92 3	147 55	3	2.76	4	2 6	36.958
1286	h. 3797	5 40	136 22	176 0	2	50.40	1	7′ 8′	35.936
1287				174 52	2	50.61	1	8′ 9	36.082
1288	h. 3803	5 42	134 55	114 45	3	17.52	1	7 8	35.936
1289				116 8	1	......	..	7 10	37.068
1290				109 30	1	22.45	1	8 11	37.920
1291	h. 3823	5 54	121 4	129 35	2	5.04	1	8′ 8′	36.082
1292				128 33	3	5.00	2	9 = 9	36.988
1293				133 8	2	4.66	4	8′ 8′	37.071
1294				131 18	3	4.93	2	9 9	37.110
1295	Δ. 23	6 0	138 26	162 27	2	3.86	2	8 = 8	35.016
1296				163 27	3	......	..	8 = 8	36.878
1297	B. 1201 "double."	6 12	155 29	114 6	2	22.66	2	7 8′	34.947
1298				116 51	2	20.51	1	7 8′	36.082
1299				114 16	3	21.21	4	8 9	37.019
1300	B. 1210 + 1211 = Δ. 27?	6 14	149 8	223 24	3	55.66	1	6 7′	35.923
1301				224 54	3	55.02	4	6′ 8	37.068
1302	h. 3849	6 14	129 25	51 20	2	38.59	2	6′ 7	37.942
1303				53 13	2	40.27	2	7 7′	38.036
1304	h. 3857 = B. 1229	6 18	126 38	66 2	3	70.27	3	6 7	37.945
1305				66 32	2	68.45	2	5′ 7	38.082
1306	B. 1254 + 1256	6 24	130 16	110 12	2	71.00	2	6′ 6′	38.090
1307	B. 1267; Δ. 30	6 26	140 7	317 8	3	13.83	2	6 9	34.945
1308				318 51	2	13.24	1	6 9	35.923
1309	B. 1320 + 1321; Δ. 31; V. Puppis	6 34	138 4	318 45	3	13.87	2	5′ 8	35.016
1310				314 49	3	12.30	1	6 7′	36.082
1311				317 45	2	13.19	4	......	37.019
1312	h. 5443 = B. 1328	6 36	130 11	105 2	3	17.42	1	......	35.936
1313				104 9	2	17.09	1	9′ 10	36.082
1314	B. 1335; Δ. 32	6 36	128 14	276 45	3	8.97	2	6′ 8′	35.016
1315				275 3	2	7.36	1	6′ 8	36.008

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1316	h. 3889 = B. 1340	6 39	140 17	265 12	3	43.53	1	6′ 8	35.923
1317				266 57	3	42.11	3	6′ 9	37.068
1318	h. 3891 = M. 2677..................	6 39	120 47	222 13	2	4.99	3	6 9′	37.936
1319				221 48	2	5.07	2	6 9′	38.036
1320				221 55	1	......	..	6 10′	38.063
1321	B. 1464 + 1465 = Δ. 38	6 59	133 23	121 35	3	20.16	1	6′ 7	35.911
1322				120 28	3	20.62	1	6 8	36.008
1323	h. 3928....................A. and B	6 59	124 31	157 55	3	5.76	1	6′ 8	36.006
1324				156 44	2	5.09	2	7 8′	36.988
1325				158 17	2	5.50	2	6′ 8′	37.110
1326	.... A. and C.	......	......	286 50	2	37.87	1	6′ 9′	36.006
1327				285 33	2	37.27	1	7 10	36.988
1328				287 10	2	36.56	2	6′ 10	37.110
1329	B. 1475 ; Δ. 39	7 1	148 56	72 43	1	3.49	1	6′ 7	35.022
1330				74 19	2	2.09	2	6′ 8	35.027
1331				74 2	3	......	..	6′ 7′	36.079
1332				78 6	2	2.06	2	6 7′	38.110
1333	h. 3931 = B. 1473	7 1	132 4	40 41	3	72.46	1	6′ 8	35.923
1334				41 5	2	73.38	1	7 7′	36.079
1335	Δ. 40 = B. 1500 + 1501	7 6	146 5	139 30	2	38.53	3	6′ 7′	38.090
1336				140 55	2	37.51	2	7 8	38.110
1337	B. 1507 ; Δ. 41 ; R. 5................	7 7	145 18	223 44	3	7.86	2	7′ = 7′	35.016
1338				226 18	2	7.29	1	7 7′	36.008
1339	h. 3941 = B. 1508	7 7	150 6	322 0	0	$\frac{3}{4}$	0	9′ 9′	36.096
1340				309 58	1	1	0	8′ 8′	37.068
1341				310 48	1	$\frac{2}{3}$	0	8′ 8′	37.110
1342	h. 3945............................	7 9	113 2	67 27	3	28.20	3	6′ 7	37.153
1343				67 43	2	28.23	3	6′ 8	37.301
1344	B. 1523 "double"	7 9	120 36	181 11	3	38.03	2	6′ 8	38.090
1345				181 30	3	37.15	3	6′ 7′	38.110
1346	B. 1529 + 1530 = Δ. 42	7 10	160 13	301 12	3	12.82	3	5 7	35.027
1347	γ *Volantis*			301 10	3	12.62	3	5 6′	35.112
1348				301 10	4	12.86	3	6 8	37.110
1349				301 55	3	12.96	3	5 7	38.110
1350	h. 3949 = B. 1542	7 12	120 30	75 20	3	4.74	1	......	36.068
1351				71 55	3	3.22	4	8 8	36.974
1352				77 12	3	2.79	4	8 8′	38.112
1353	h. 3958............................	7 16	141 53	281 35	3	31.40	1	7 8	35.936
1354				282 1	3	33.23	1	7′ 9	36.008
1355				282 10	2	32.11	4	7′ 9′	37.110
1356	B. 1578. R. 6.	7 16	142 0	15 57	2	10.99	2	6′ 7	34.945
1357				16 15	3	9.98	2	7 7′	35.027
1358	h. 3960 = B. 1576	7 16	138 12	163 40	3	7.86	1	8′ 10	35.027
1359				164 5	2	7.71	1	9 10	36.988
1360				163 57	3	9.42	3	9 10	37.068
1361	B. 1582 + 1583	7 17	138 13	157 57	3	22.41	2	7′ 8′	35.027
1362				157 5	3	23.72	2	7 8	36.988
1363				157 40	3	22.35	4	6′ 8	37.068
1364	h. 3966	7 19	126 57	141 27	2	6.59	1	7′ = 7′	35.911
1365				140 33	3	7.48	1	7 = 7	36.008
1366	B. 1603 + 1604	7 20	151 38	209 55	2	179.00	1	6′ 8	36.988
1367	Δ. 49 ; B. 1622	7 22	121 30	52 37	3	9.10	2	7 7′	35.909
1368				53 3	3	8.93	1	6′ 7	36.082
1369				50 34	3	10.47	4	7 8	36.994
1370				51 41	3	9.04	5	......	37.153
1371				50 57	3	9.99	4	6′ 7′	38.063
1372	B. 1631 = Δ. 51. σ Argus	7 24	132 58	75 33	3	21.77	1	4 10	35.911
1373				74 32	3	23.27	1	5′ 10	36.096
1374	B. 1648 = Δ. 52. *n* Puppis..........	7 27	113 7	107 15	3	9.52	1	6 6	35.909
1375				106 33	4	9.46	4	7 7	36.994
1376				106 37	3	9.25	4	6′ 6′	37.074
1377	h. 3984 = B. 1661	7 29	144 48	258 35	2	63.33	1	7 7′	36.082
1378				257 0	2	64.67	4	7′ 8′	38.063
1379				258 45	1	64.75	3	7 8	38.076
1380	h. 3988 = B. 1673	7 31	138 28	300 54	2	18.01	1	8 10	36.008
1381				298 20	2	16.15	3	8 10	37.030
1382	B. 1679 + 1680 ; Δ. 53 ; *k* Puppis	7 32	116 24	138 33	3	10.38	4	5 = 5	34.925
1383				136 38	3	11.16	2	5 = 5	36.988
1384				138 13	3	9.69	4	5′ = 5′	38.090

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1385	h. 3994 = B. 1702.…………… A B	7 35	138 40	17 7	3	14.91	1	6′ 10	35.118
1386				16 52	2	11.74	2	7′ 10′	37.030
1387				17 45	1	14.07	1	7 11	38.076
1388	A C.	……	……	216 19	3	17.31	1	6′ 11	35.118
1389				217 42	2	20.62	2	7 11	37.030
1390	h. 3997 = B. 1731 ………………	7 39	163 53	101 46	2	1.92	1	8 8	36.096
1391				99 50	2	1.71	4	8 = 8	37.019
1392	B. 1740 + 1741 = Δ. 55 …………	7 40	140 2	132 47	2	50.64	3	7′ 8′	36.994
1393				133 3	2	51.24	3	6′ 8	38.063
1394	h. 4005 = B. 1762 ………………	7 41	146 18	220 23	1	39.31	1	6 11	35.030
1395				219 38	1	36.66	1	6 12	38.076
1396	B. 1753 + 1754 ………………	7 41	131 4	176 52	2	48.21	2	7 7′	34.939
1397				176 50	3	50.06	2	7 7′	38.076
1398	h. 4018 ……………………A B	7 49	149 11	325 35	1	……	..	8 11	37.066
1399				321 52	2	6.06	1	7′ 10′	38.079
1400	A C.	……	……	258 45	1	60.38	1	7′ 11	38.079
1401	h. 4024………………………	7 53	119 3	78 50	2	10.75	2	8 10	36.994
1402				82 41	3	10.58	3	8 9	37.074
1403	h. 4027………………………	7 54	150 21	114 59	3	9.13	3	8′ 9	35.118
1404				115 28	2	9.70	3	9 9′	37.110
1405	h. 4028 = B. 1848 ………………	7 54	139 31	46 35	3	17.89	1	7′ 7′	36.175
1406				47 13	3	16.84	4	7 = 7	37.060
1407	h. 4031………………………	7 56	150 24	360 57	3	6.01	2	8 8′	35.118
1408				357 57	2	6.56	3	8 9	37.110
1409	h. 4032 = B. 1851 ………………	7 56	136 50	351 52	2	31.85	1	7 9	35.030
1410				351 2	2	29.69	2	6′ 10	38.079
1411	h. 4038 = B. 1872 ………………	7 57	130 50	344 9	2	29.50	3	7 8′	37.030
1412				346 40	2	28.71	3	……	37.060
1413	B. 1875 = Δ. 60………………	7 57	144 3	161 23	2	40.78	1	7′ 9′	35.914
1414				159 28	2	40.30	3	6 9	38.082
1415	h. 4046 = B. 1887………………	7 59	123 5	88 33	2	22.84	2	6 8	37.920
1416				88 25	2	21.74	2	6′ 9	38.079
1417	B. 1903 + 1906 = Δ. 62 …………	8 2	152 21	264 26	1	88.12	1	6 7	35.011
1418				264 30	3	87.83	3	6 7	37.274
1419	B. 1914; Δ. 63…………	8 4	132 8	80 26	4	5.76	1	7′ 9	35.914
1420				80 38	3	6.14	1	6′ 8	36.172
1421	γ Argus. B. 1916, 7, 8; Δ. 64,5 (A B)	8 4	136 50	220 43	3	41.19	4	2 6	35.027
1422				219 38	3	41.12	3	……	35.183
1423	……………………… (A C)	……	……	152 10	2	……	..	……	35.027
1424				151 9	3	62.40	2	2 8	35.183
1425	……………………… (B C)	……	……	111 48	2	……	..	6 8	35.027
1426	h. 4055………………………	8 6	159 23	8 27	3	6.64	3	8 8+	37.066
1427				10 31	3	6.88	3	9 9	37.096
1428	h. 4057 = B. 1929 ………………	8 7	132 29	297 45	3	23.89	1	6 9′	36.156
1429				297 52	2	23.68	2	5′ 9′	38.079
1430	h. 4060………………………	8 7	125 56	177 2	1	21.59	2	9 10	36.988
1431	B. 1940; R. 7; Δ. 66 (ε Volantis)….	8 7	158 7	21 21	2	7.67	1	5 10	35.008
1432				24 11	4	6.20	2	6 10	35.016
1433	B. 1941 + 1942 = Δ. 67 …………	8 8	125 49	175 1	2	68.86	2	6 7′	36.988
1434				175 27	2	66.51	3	5′ 6	38.090
1435	h. 4069 = B. 1948 ………………	8 9	135 19	258 57	3	33.25	1	6 8′	35.914
1436				254 33	3	33.24	4	7 9	37.066
1437	B. 1974 "double." ………………	8 13	134 30	147 16	2	5.66	2	8 8	35.027
1438				146 20	1	5.76	1	8′ 8′	35.909
1439				146 15	3	4.33	2	8′ 8′	37.153
1440	h. 4087………………………	8 16	130 27	146 37	3	1	0	8′ 8′	37.153
1441				147 30	1	$\frac{2}{3}$	0	8 8	38.082
1442	B. 2018 + 2022 + 2023. (A B)	8 20	160 58	55 2	2	64.97	1	6 6′	35.917
1443	……………………… B C.	……	……	28 45	2	34.16	1	6′ 7	35.917
1444	Δ. 70 = B. 2054………………	8 24	134 10	349 42	2	……	0	6 8′	35.008
1445				350 52	3	6.73	0	6 9	35.016
1446				349 23	2	4.27	1	6 9	35.925
1447				351 27	1	6.01	3	6 9′	36.994
1448	h. 4104 = B. 2056. (A B) ……	8 24	137 21	242 41	3	4.48	1	6 9′	35.279
1449				241 25	3	4.39	1	6 8	36.172
1450				242 45	3	4.33	1	5′ 9′	38.082
1451	……………………… (A C)	……	……	39 58	2	21.10	1	6 10	35.279
1452				39 49	3	19.03	1	6 9′	36.172
1453	h. 4126 = B. 2143 ………………	8 35	142 29	31 12	3	16.49	1	6 9′	35.030
1454				30 34	3	14.92	1	6 10	36.172
1455				32 38	2	16.73	2	6 10	37.019

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1456	h. 4128 = B. 2153	8 36	149 43	218 6	1	2.92	1	7′ 8	35.936
1457				223 53	2	2.31	2	8 8′	37.019
1458	h. 4130 = B. 2159	8 37	146 57	230 5	1	4±	0	7′ 10	35.914
1459				222 15	1	3±	0	7 11	37.446
1460	B. 2168 + 2169	8 38	142 30	309 31	3	76.57	1	6 6′	36.172
1461				......	..	77.51 nisi	2	......	do
1462				310 8	3	64.79	3	6 6′	37.066
1463	h. 4133 = B. 2179 = d Velorum	8 38	132 2	60 51	3	47.20	1	5 11	35.123
1464	B. 2206 "double;" R. 9 ; (A B)	8 41	148 6	110 43	1	......	..	8 = 8	35.914
1465				112 49	3	4.67	1	......	do
1466				108 9	3	4.59	3	8 8	37.019
1467				109 36	4	5.10	4	8 8	37.137
1468				109 52	2	4.92	3	8 8	37.274
1469	.... ½ (A + B), C.	......	......	354 15	1	......	..	8 11	35.914
1470	.... ½ (A + B), D.	......	......	217 5	1	......	..	8 10	35.914
1471	S. 585	8 47	107 36	145 29	3	68.95	3	5′ 7	37.208
1472	B. 2283 + 2286. Δ. 73 ?	8 51	144 53	356 0	3	66.64	1	7′ 7′	35.123
1473				357 9	3	66.60	3	7 7	37.074
1474				356 13	3	66.27	3	7, 7	37.381
1475	B. 2293 + 2294. Δ. 74 b′ Carinæ	8 53	148 34	73 44	3	42.62	1	5′ 7	34.939
1476				75 35	3	38.80	1	6 7	35.123
1477				75 32	2	40.63	4	6 8	37.381
1478				75 26	3	40.39	2	5′ 7	38.112
1479	h. 4165 = B. 2320	8 56	141 31	88 27	3	1.41	2	6 8	37.230
1480				87 30	1	1¼	0	6′ 8	37.300
1481	h. 4172	8 59	114 43	216 16	2	7.81	2	9 10	37.071
1482				216 49	3	7.22	2	8′ 9′	37.301
1483	h. 4188 = B. 2387	9 6	132 55	286 38	3	2.43	1	6 7	35.320
1484				287 14	3	3.40	2	7 8	36.096
1485	B. 2452 ; R. 10	9 16	159 5	18 55	2	11.18	2	8′ 8′	38.090
1486				17 54	3	11.62	3	8 8	38.112
1487	B. 2941 ; ζ Octantis	9 20	174 58	108 30	1	1¼	0	6 9′	35.030
1488				117 59	1	1.71	1	5′ 10	35.134
1489	B. 2505 + 2507 = Δ. 76	9 22	134 45	97 51	3	59.57	3	6′ 7	38.090
1490	B. 2511 + 2512. Δ. 77	9 23	133 48	257 48	2	108.47	3	8 8	37.099
1491	B. 2515 = ζ Antliæ. Δ. 78.....	9 23	121 10	210 3	3	8.91	4	6′ 7	35.107
1492				210 45	3	8.12	2	6 7	36.082
1493				212 8	2	......	..	6 7	37.192
1494				210 6	3	7.97	4	......	do
1495	h. 4220 = B. 2546	9 28	138 15	202 25	3	2.03	1	7 8	35.312
1496				201 24	3	3.23	2	6′ 7	36.096
1497				202 20	2	3.23	2	6′ 8	37.381
1498	B. 2544 + 2547. Δ. 79 ?	9 28	138 59	30 40	3	128.75	1	7′ 7′	35.099
1499				30 30	2	130.26	2	7 = 7	35.183
1500				31 25	3	132.12	2	7 7	37.137
1501	B. 2647. Δ. 80	9 39	138 43	67 0	3	18.48	1	7′ = 7′	36.003
1502				69 19	3	19.05	1	8 = 8	36.082
1503				69 13	3	17.27	1	8 8	36.172
1504	h. 4249	9 42	124 14	126 37	2	3.81	1	8 = 8	35.312
1505				125 32	3	6.21	1	8′ 8′	36.101
1506				123 48	3	4.55	3	8 8	37.192
1507	B. 2682 = *v* Argus	9 43	154 17	123 31	2	6.29	1	3 9	36.175
1508				126 14	3	4.77	3	3, 7	37.019
1509				127 40	3	4.57	3	3′ 9	37.066
1510	h. 4252	9 43	154 18	303 28	2	13.46	1	9 9	36.175
1511				300 35	3	12.74	2	10 = 10	37.066
1512	B. 2723. Δ. 81	9 48	134 29	240 18	3	6.18	1	6 9′	35.183
1513				237 52	2	6.53	1	6 10	36.101
1514				238 48	3	5.13	1	6 11	37.162
1515	h. 4272 = Δ. 82 ?	9 51	175 13	267 21	3	16.32	4	7 7	37.077
1516				267 58	3	16.05	2	7′ = 7′	37.312
1517				267 49	3	17.46	1	7 7	37.381
1518				265 43	3	15.17	1	7 7′	37.446
1519	B. 2796 + 2800. Δ. 83	9 56	144 10	222 55	3	110.33	2	8 8	37.099
1520				222 10	1	108.68	2	6′ 7	37.381
1521	h. 4282	9 57	141 15	204 0	2	71.56	1	7 8	36.003
1522				205 38	3	70.15	4	7 8	37.071
1523	h. 4283 = B. 2824	9 58	140 58	181 28	2	7.23	2	8 9	36.003
1524				180 34	3	7.33	1	8 9′	36.164

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1525	h. 4289	10 3	153 46	59 44	3	9.78	1	10 10	37.151
1526				61 38	2	13.82	1	11=11	37.375
1527	h. 4306 = B. 2955	10 13	153 49	141 40	1	$1\frac{1}{2}$	0	7 = 7	36.175
1528				139 39	2	1.60	1	7 7	36.178
1529				138 19	3	1.26	3	=	37.151
1530	B. 2972 = T Velorum = R. 13 ; .. A B	10 15	145 11	102 40	2	7.37	2	5′ 10	35.120
1531				103 54	4	6.82	3	5 10	37.375
1532	Do. A C	......	......	192 0	1	37.15	1	......	35.120
1533				191 10	3	36.28	1	5′ 10	36.178
1534	h. 4323	10 23	151 43	219 9	3	21.78	4	8′ 8′	37.099
1535				220 8	3	22.98	3	8 8′	37.214
1536	B. 3047 + 3048 = Δ. 86	10 24	131 21	291 50	3	82.71	2	7 8	38.090
1537	h. 4327	10 24	143 38	352 15	2	113.73	1	8 8	37.099
1538	B. 3055 + 3057. Δ. 87	10 25	150 29	331 40	2	85.03	1	7′ 7′	35.249
1539				330 15	1	82.76	2	6′ 7	37.446
1540	Δ. 88 = S. Velorum	10 25	134 12	37 29	3	12.65	2	6 6	36.003
1541				38 6	3	14.46	1	7 7	36.159
1542				38 22	3	14.75	2	6′ 6′	37.162
1543				37 18	2	....	..	......	37.375
1544	h. 4329 = B. 3062 = Y Velorum	10 25	142 51	17 5	3	17.59	3	5′ 9	37.077
1545				17 46	3	17.48	3	6 9′	37.162
1546	h. 4330 = B. 3069 = t Velorum	10 26	136 8	165 47	3	40.65	1	6 9	36.159
1547				164 4	3	40.66	3	6 9	37.214
1548	h. 4332	10 26	136 6	165 17	3	25.93	1	7 10	36.159
1549				164 24	3	26.84	1	8 10	37.214
1550	Δ. 89	10 26	144 30	30 36	3	26.19	2	7′ 8′	37.099
1551				30 29	2	26.68	2	6 6′	37.162
1552				31 5	3	26.38	3	......	37.214
1553	B. 3086 "double." = Δ. 91	10 28	161 14	58 44	3	8.75	2	8 8	35.183
1554				59 42	3	10.64	3	8′ 9	37.183
1555				58 52	2	10.82	1	9 9+	38.090
1556	B. 3103 + 3104. Δ. 93	10 29	153 15	37 43	2	25.32	1	8 8′	35.118
1557				37 40	3	26.93	2	8 9	37.408
1558	B. 3127 = Δ. 94	10 32	148 18	20 38	3	15.74	2	6 9′	36.175
1559				22 12	3	14.92	3	5′ 10	37.153
1560	B. 3125 = Δ. 95 = X Velorum	10 33	144 43	105 9	3	51.85	2	6 8	38.088
1561	h. 4346	10 35	150 8	82 0	1	26.63	1	8 9	37.145
1562				80 42	2	26.29	1	8′ 11	37.408
1563	B. 3181 "double."	10 37	150 17	173 40	3	12.84	2	7 11	37.110
1564				173 41	3	13.34	3	7 9	37.145
1565				172 57	3	12.54	2	7′ 9	37.153
1566				173 58	2	13.22	2	7 9′	37.381
1567	h. 4356	10 37	148 39	147 56	3	3.00	1	8 10	36.323
1568	h. 4359	10 37	149 12	234 47	2	$1\frac{1}{2}$	0	8 11	37.3
1569	B. 3194 "double."	10 38	148 51	214 1	3	17.14	1	8′ 9′	36.164
1570				214 59	3	18.65	3	8′ 9	37.225
1571	h. 4360. Triple AB	10 38	148 41	119 13	2	3.43	$\frac{1}{2}$	A+B=8 ∴9=9	35.118
1572				115 13	2	2.38	1	9 9	36.323
1573				114 2	0	0.82	$\frac{1}{2}$	9 9	37.225
1574	$C\left(\frac{A+B}{2}\right)$ = B. 3190	......	......	109 59	2	14.29	1	8 8	35.118
1575				108 16	4	13.16	2	8 8	36.315
1576				108 23	3	14.19	2	8 8	37.225
1577	h. 4364	10 38	148 28	350 45	2	......	..	8 10	36.315
1578				353 56	2	6.69	3	8 9′	37.225
1579	B. 3203 = Δ. 99. A B.	10 39	159 58	75 22	3	63.92	1	7 7	37.145
	A C.			40 15	2	......	..	7 9	do
	B C.			285 35	2	......	..	7 9	do
1580	h. 4374	10 42	148 33	115 15	1	10.14	0	8 10′	36.315
1581	h. 4378 = B. 3252	10 45	149 3	344 27	3	30.89	1	7′ 10	36.164
1582	B. 3274 + 3276 ; Δ. 102 ; ...... A B.	10 47	147 57	13 0	1	65.28	1	4′ 8	37.145
1583	Ditto Δ. 103 ; ...... A C.	......	......	200 10	1	163±	0	4 7	37.145
1584	h. 4383	10 48	159 50	285 50	1	1.42	0	7 8′	37.183
1585	h. 4393 = B. 3314	10 51	158 8	131 0	3	7.10	1	7′ 10	35.312
1586	h. 4409 = B. 3400	10 59	131 43	276 38	2	1.15	2	6 9	37.153
1587				279 23	2	1.89	1	5′ 11	37.444
1588	h. 4423 = B. 3501	11 9	134 57	270 42	2	1.37	3	7′ = 7′	35.120
1589				265 37	2	1.15	2	7′ 7′	37.183
1590				273 11	1	......	..	6′ 7	37.444

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1591	h. 4432 = B. 3562	11 17	154 2	287 3	3	2.46	1	6 8	35.309
1592				290 42	2	2.32	2	6′ 8	37.107
1593	B. 3574 "double."	11 17	150 43	296 10	3	6.18	3	8 9	38.088
1594				297 33	2	6.58	3	8 9	38.110
1595	B. 3594 + 3595	11 20	131 44	167 20	3	13.19	2	6 8	35.183
1596				166 5	2	......	..	6 8	35.320
1597				167 0	2	12.43	1	6 8	35.364
1598	17 *Hydræ*. H. III. 96	11 24	118 20	30 13	3	8.92	4	6 = 6	35.107
1599	h. 4455 = B. 3670	11 28	122 38	245 18	3	4.25	2	6 8′	36.493
1600				244 45	3	3.84	4	6′ 9	37.192
1601				244 27	1	......	..	6 10	37.408
1602	B. 3706 "double."	11 32	152 32	275 42	2	25.97	2	7′ 8′	38.088
1603	h. 4478 = β. Hydræ Crater	11 44	122 58	337 41	3	1.98	3	4 4′	34.465
1604				338 50	3	1.71	2	5 6	34.468
1605				340 44	3	1.87	2	5 5′	35.107
1606				337 53	3	2.50	1	4 4′	35.353
1607				338 30	3	2.86	2	5′ 6	36.493
1608				342 24	3	1.78	3	5 5	37.235
1609				342 15	2	1.86	2	4′ 5	38.088
1610	B. 3828 "double."	11 47	151 38	265 48	2	17.73	2	8 9′	38.088
1611	B. 3836. Δ. 116	11 48	121 19	82 55	3	21.84	1	8 8	36.337
1612				83 17	3	20.06	2	8′ = 8′	36.493
1613	h. 4486 = ε. *Chamæleontis*	11 51	167 16	178 38	3	1.73	1	5′ 6	35.120
1614				178 0	2	1.51	2	6′ 7	37.153
1615	h. 4487	11 52	125 48	124 45	2	5.65	1	10 10	36.493
1616	B. 3904 + 3905 ; Δ. 117 ; ...... A B.	11 56	151 3	150 10	3	23.68	3	8 8	37.156
1617				150 48	2	23.29	3	8 8′	37.446
1618	Ditto, A C.	......	......	19 40	3	26.96	3	8 10	37.156
1619				19 58	1	25.60	1	8 11	37.446
1620	h. 4495 = B. 3918	11 57	122 0	315 21	3	7.10	2	7 10	35.181
1621				312 21	3	7.08	2	7 10	37.235
1622	h. 4522	12 16	158 32	65 34	3	13.12	2	8 9	37.153
1623				68 50	3	13.70	2	8′ 9	37.446
1624	*α* Crucis = Δ. 123 ....A B.	12 17	152 9	122 57	3	......	..	......	34.348
1625				120 56	5	......	..	2′ 2′	34.367
1626				121 1	3	5.26	..	2 3	34.468
1627				119 55	3	5.34	2	......	35.052
1628				120 57	4	5.53	4	......	35.107
1629				121 42	2	......	..	......	35.183
1630				122 27	3	6.44	1	2′ 3	35.268
1631				119 38	3	5.70	1	......	35.282
1632				120 5	3	5.57	1	1′ 2	36.145
1633				121 13	2	6.31	1	2 3	36.153
1634				119 48	3	4.96	2	1′ 1′	36.178
1635				122 19	2	......	..	......	36.194
1636				120 20	3	......	..	2 2	36.233
1637				119 19	3	5.83	4	......	37.145
1638				120 47	2	5.27	3	2 2	37.230
1639				120 3	3	6.62	2	2′ 3	38.055
1640				120 4	3	5.30	3	2 2′	38.107
1641	*α*. Crucis (A C.) Δ. 122	......	......	201 34	3	92.89	1	......	35.268
1642				201 30	2	91.99	1	......	35.282
1643				202 5	2	......	..	1′ 6	36.178
1644				202 3	2	89.60	1	......	37.230
1645				201 44	3	90.09	4	1′ 7	37.370
1646				198 2	1	......	..	......	38.107
1647	σ. 415 = δ Corvi	12 21	105 34	213 0	3	23.44	2	3′ 10	37.479
1648	h. 4539 = γ Centauri	12 32	138 1	354 50	1	∠ 1″	0	......	35.257
1649				360 20	1	......	..	......	35.260
1650				351 21	2	$\frac{2}{3}$	0	4 4′	35.320
1651				346 47	2	......	..	3 3	35.353
1652				349 37	1	......	..	4 4	35.367
1653				355 20	1	......	..	5 5	36.145
1654				361 58	2	......	..	4 4′	36.156
1655				355 25	1	......	..	......	36.192
1656				347 27	1	......	..	......	36.493
1657				361 55	1	1″	0	......	37.140
1658	Σ. 1669	12 32	102 5	122 8	3	7.20	4	7′ 7′	37.235
1659				122 26	3	7.57	2	6′ 6′	37.381

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1660	(γ Virginis)........................	12 33	90 31	48 17	2	......	..	4 4	34.334
1661				48 20	2	......	..	4 4	34.340
1662				37 22	2	Contact	..	......	34.359
1663				39 45	1	......	..	......	34.361
1664				44 22	1	......	..	......	34.386
1665				38 33	3	1.51	3	4′ 4′	34.389
1666				41 59	2	......	..	5 5	34.392
1667				46 11	3	......	..	......	34.413
1668				46 53	2	......	..	......	34.413
1669				44 40	2	......	..	......	34.435
1670				23 8	2	......	..	......	34.517
1671				34 16	2	......	..	......	34.567
1672				34 11	2	......	..	......	34.572
1673				32 24	3	0.5	0	......	34.611
1674				31 27	3	......	..	......	34.611
1675				19 50	1	$\angle 1''$	0	......	35.027
1676				21 57	2	......	..	......	35.052
1677				20 40	1	......	..	......	35.074
1678				17 56	1	......	..	......	35.085
1679				23 35	2	......	..	......	35.107
1680				22 55	1	......	..	......	35.145
1681				13 40	1	......	..	......	35.172
1682				23 48	3	......	..	......	35.181
1683				237 28	2	0.67	0	......	38.079
1684				220 55	0	......	..	......	38.082
1685	h. 4556............................	12 45	117 2	80 20	3	7.77	1	8 10	36.337
1686				78 55	2	6.76	1	7′ 10	36.493
1687				81 25	3	6.91	3	8 10	37.460
1688	h. 4558............................	12 47	119 13	179 5	2	25.40	1	9′ 9′	36.337
1689				177 30	2	21.78	2	10 10	37.381
1690	B. 4268 + 4271. Δ. 127	12 50	144 59	126 20	2	16.35	2	8 9′	37.183
1691				126 0	3	16.71	3	8 9	37.444
1692	h. 4563............................	12 52	122 42	236 48	3	6.33	3	7 9′	37.235
1693				236 45	3	6.77	3	7′ 10	37.457
1694	Δ. 128 = ξ^2 *Centauri*................	12 57	139 0	100 52	2	26.48	2	5 10	35.120
1695				99 59	3	25.55	2	5 10	37.444
1696	B. 4323 = R. 16; Δ. 129; θ *Muscæ* ..	12 57	154 24	188 35	3	5.12	1	6 8	35.364
1697				188 24	3	5.75	2	7 9	36.192
1698				185 23	2	6.12	3	6′ 10	37.183
1699				186 33	2	5.77	1	6 10	37.408
1700	B. 4367 + 4369. Δ. 131. η *Muscæ*..	13 4	156 58	332 50	2	58.32	2	5′ 7	35.120
1701				331 53	3	57.75	1	5 8	35.364
1702				332 28	2	60.99	1	7 9	36.238
1703				331 17	3	59.91	3	5′ 8	36.567
1704				333 23	2	61.83	2	5′ 8	37.444
1705	h. 4580 = B. 4431..................	13 13	137 40	10 15	1	0.5	0	8 8	36.192
1706	h. 4586 = B. 4460	13 16	156 59	151 30	2	3.67	2	8 10′	37.444
1707				147 18	1	......	..	7′ 10	37.457
1708	B. 4494; R. 17	13 21	152 10	357 17	3	17.26	4	8 8′	37.183
1709				359 5	3	16.30	2	7′ 9	37.381
1710	A. 1552 = Δ. 138. f. *Hydræ*	13 27	115 37	192 21	3	10.24	4	7 7′	34.307
1711				190 13	3	9.86	4	5′ 7	34.465
1712				191 50	3	9.95	1	6 7	35.345
1713	B. 4582; Q *Centauri*; Δ. 141	13 31	143 42.	165 6	3	5.23	2	6 7	35.364
1714				163 15	4	5.69	1	6 8	35.427
1715	B. 4597 + 4598. Δ. 142.............	13 32	148 22	90 10	2	30.99	1	......	35.345
1716				90 43	2	33.89	2	7 8′	37.389
1717	h. 4607............................	13 32	161 8	76 18	3	11.16	2	8′ 9′	37.183
1718				76 15	3	11.83	3	8′ 10	37.389
1719	B. 4629 + 4630. Δ. 143	13 37	151 14	35 30	2	14.78	1	8 9	36.285
1720				36 4	3	12.22	4	7′ 8	37.277
1721	Δ. 144............................	13 39	136 31	255 38	3	7.94	1	8′ 10	36.567
1722				257 14	3	9.69	3	8 9	37.277
1723	B. 4655 + 4656; R. 18; (N. *Centauri.*)	13 41	141 58	288 40	3	18.15	4	6′ 8	37.277
1724				289 6	3	18.48	2	6 9′	37.370

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1725	Δ. 145	13 42	156 8	50 21	3	23.06	1	7′ 8′	36.567
1726				51 30	3	24.44	4	8 9	37.277
1727				49 15	3	25.75	3	8 9	37.370
1728	B. 4662. Δ. 148. k. *Centauri*	13 42	122 8	114 41	2	7.83	1	6 7′	35.345
1729				111 59	3	10.03	1	5′ 7′	36.159
1730				111 2	3	8.40	1	......	36.162
1731				113 4	3	9.25	4	......	36.493
1732				113 30	3	8.32	3	6 8	38.110
1733	B. 4669 "double." Asc. 1580. h. *Centauri*	13 43	121 5	185 20	2	13.14	2	5 10′	37.457
1734				185 53	2	14.39	2	5′ 10	37.482
1735	h. 4634..........................	13 46	145 12	310 35	2	12.40	1	7 8′	35.345
1736				309 9	3	10.64	1	7′ 9	35.427
1737				310 32	2	11.40	2	7′ 9	36.233
1738	Δ. 154	13 55	125 43	131 20	3	22.70	1	8 9	36.386
1739				130 45	2	20.61	2	8′ 9	37.444
1740	B. 4763 "double." Δ. 155	13 56	142 52	27 42	2	24.00	2	7′ 8	36.493
1741				27 51	3	24.85	3	8 8	37.370
1742	h. 4651 = B. 4778	13 58	140 42	133 56	3	62.17	3	6 9	36.567
1743				134 10	2	63.91	2	6 9	37.446
1744	Σ. 1807	14 3	92 31	26 54	3	7.93	3	8′=8′	37.479
1745	h. 4671..........................	14 9	169 19	128 44	2	6.27	1	8′ 9	36.238
1746				126 3	2	5.61	2	8′ 9	37.446
1747	B. 4864 + 4865; R. 19; Δ. 159	14 11	147 40	164 21	3	10.04	2	6 8	36.233
1748	Y. *Centauri*.......................			161 47	3	9.40	3	6′ 9	36.610
1749				163 40	2	9.56	2	6 8	37.446
1750	Σ. 1833	14 14	96 59	163 59	3	6.25	3	7′=7′	37.479
1751	Σ. 1837	14 16	100 49	321 33	2	$1\frac{1}{4}$	0	7′ 9	37.482
1752	h. 4687..........................	14 25	125 49	81 5	1	2.46	1	10=10	36.377
1753				83 32	3	2.03	2	9 9	37.649
1754	h. 4691..........................	14 27	144 57	270 5	1	9.56	1	8′ 9	37.140
1755				269 2	1	11.06	1	9 10	37.446
1756	A. 1654. *α Centauri*	14 28	150 8	217 20	3	17.83	2	......	34.331
1757	B. 4990 + 4991. Δ. 165.			218 27	3	17.59	2	1 2′	34.435
1758				219 7	3	17.41	3	......	34.468
1759				219 10	2	......	..	......	35.052
1760				218 26	4	17.33	2	1 2	35.107
1761				218 53	4	17.02	2	1 2′	35.186
1762				218 36	3	......	..	......	35.271
1763				220 43	4	......	..	1 2	35.370
1764				218 53	3	......	..	1 2′	35.353
1765				219 17	2	......	..	1 2′	36.145
1766				218 58	3	......	..	1 1′	36.162
1767				217 51	3	......	..	1 1′	36.178
1768				219 43	3	......	..	1 2	36.244
1769				221 31	2	......	..	......	36.258
1770				220 28	2	......	..	......	36.285
1771				220 36	2	......	..	......	36.394
1772				220 16	3	16.76	4	......	36.610
1773				219 38	2	15.71	2	......	37.153
1774				219 53	2	16.28	4	1 2	37.183
1775				221 36	3	16.81	3	......	37.266
1776				221 29	3	16.77	3	1 2	37.277
1777				220 32	3	15.44	4	......	38.082
1778				220 10	2	15.57	3	......	38.107
1779				221 55	2	15.09	2	......	38.110
1780	h. 5444..........................	14 29	144 12	70 8	2	20.23	2	9 10′	37.389
1781	A. 1655; B. 4995; Δ. 166 (*α Circini*)	14 29	154 14	245 23	2	15.62	1	4 10	36.192
1782				242 59	3	15.55	4	4 9	36.567
1783				243 56	3	15.50	3	3′ 10	37.277
1784				243 40	3	15.99	2	4 9	38.107
1785	Δ. 168...........................	14 31	144 27	203 13	2	7.09	1	9 = 9	36.386
1786				203 24	3	6.93	3	8 8′	37.381
1787				205 15	3	6.16	2	7′ 8	37.389
1788	A. 1167. 54 *Hydræ*	14 36	114 43	133 38	3	8.94	3	6 8	34.307
1789				135 4	3	9.35	4	5′ 8	34.465
1790				133 54	3	9.23	4	6 9	37.334
1791	h. 4706 = B. 5073	14 40	136 42	217 35	2	6.86	2	7′ 10	36.490
1792				217 18	3	7.27	4	7′ 10	37.329

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1793	h. 4707. B. 5071	14 40	155 42	230 7	1	1.50	0	8 = 8	37.329
1794				223 18	3	1.68	1	8 8′	37.452
1795				222 45	1	1.33	0	8 8′	37.482
1796				228 18	1	1.32	1	8 8	37.649
1797	B. 5089. Δ. 171	14 42	135 9	224 5	3	16.39	2	7 10	37.329
1798				224 24	3	17.22	2	7 10′	37.452
1799	h. 4712	14 43	144 44	226 50	2	......	..	8 8′	35.249
1800				227 35	3	6.27	1	8 8′	35.427
1801	h. 4715 = B. 5112	14 45	137 11	277 2	3	2.64	3	7 8	35.181
1802				277 59	3	2.98	2	6′ 7	35.364
1803				278 32	3	3.38	4	6′ 7	37.329
1804	A. 1690. H. 145, 28	14 48	110 38	278 55	2	11.35	1	5′ 7	35.452
1805				276 20	3	12.26	4	6 9	37.460
1806	h. 4728 (*π Lupi*)	14 54	136 23	111 55	1	0.67	3	5 = 5	35.181
1807				109 24	2	1.01	1	5 = 5	35.301
1808				114 4	4	0.72	1	5 = 5	35.364
1809				115 35	2	......	..	......	35.424
1810				110 13	1	......	..	......	35.564
1811				109 45	2	0.67	0	6 = 6	36.178
1812				108 46	3	0.67	0	6 = 6	37.309
1813				108 30	3	0.67	0	=	37.334
1814	*κ Lupi* = Δ. 177	15 0	138 5	144 35	3	27.15	4	5, 6	36.509
1815				145 20	2	27.25	2	4′ 6	37.444
1816				143 4	3	27.27	3	5′ 7	37.537
1817	B. 5223 = Δ. 179	15 3	132 43	46 4	3	11.59	2	7′ 9	36.490
1818				47 45	3	10.17	4	7′ 9	37.444
1819	h. 4753 = *μ′ Lupi*	15 7	137 15	172 39	2	......	..	5′ = 5′	35.567
1820				174 5	3	......	..	5′ = 5′	35.580
1821				172 46	3	1.81	1	......	36.238
1822				174 16	4	2.33	2	6′ = 6′	36.419
1823				173 45	3	2.00	3	6 7	37.309
1824	$(\mu' + \mu^2)$ *Lupi* = Δ. 180	do	do	132 0	2	......	..	5 7	35.580
1825				131 34	2	22.85	1	......	36.238
1826				130 10	2	22.78	2	5 9	36.419
1827				131 20	2	23.02	4	6 8	37.309
1828	h. 4757 = *γ Circini*	15 10	148 42	109 30	3	......	..	5′ 6	35.370
1829				109 21	2	1	0	5′ 6	35.424
1830				102 56	0	1	0	6 6′	36.192
1831				107 33	2	1.80	1	6 6′	37.460
1832				107 13	2	0.99	2	5′ 6	37.537
1833	*ε Lupi* = Δ. 182	15 11	134 4	178 40	1	27.87	1	4, 10′	35.186
1834				173 46	3	26.27	2	3′ 10′	37.364
1835				175 41	3	25.85	2	4, 9,	37.460
1836				174 9	3	26.27	4	3′ 9′	37.649
1837	Δ. 183? B. 5313. .... A B.	15 14	128 6	298 45	1	89.48	1	5 9′	36.389
1838	.... A C.	......	......	45 53	1	144.50	1	5, 9′	36.389
1839	h. 4766	15 15	132 15	116 43	3	13.14	2	8′ 10	37.364
1840				119 48	3	13.10	3	8′ 10	37.452
1841	h. 4771	15 17	147 30	186 55	3	7.33	1	8 9,	36.386
1842				189 9	2	6.49	2	8′ 8′	37.452
1843				190 25	2	5.29	2	8 9,	37.545
1844				186 40	2	5.23	2	8′ 9′	37.649
1845	h. 4772	15 17	140 50	249 37	2	12.60	1	7′ 12	36.643
1846				250 35	1	......	..	8 12	37.545
1847	h. 4776 = B. 5351	15 19	131 20	222 57	3	5.17	2	7′ 9′	34.435
1848				225 31	3	6.73	2	7 10	37.446
1849	h. 4777 = B. 5355	15 19	146 49	302 48	3	6.23	1	7′ 9′	36.643
1850				300 40	3	6.37	3	7′ 10	37.452
1851	Δ. 186	15 20	147 38	114 7	2	39.25	3	8 8	37.545
1852	h. 4784	15 22	137 0	237 30	3	34.28	1	7′ 10	36.386
1853				238 52	3	34.12	4	......	37.537
1854	h. 4783	15 22	109 35	282 30	2	10.72	1	6 10	35.452
1855				281 17	4	11.23	2	6 10	37.471
1856	S. 673	15 23	113 54	123 57	3	7.92	1	8 8	34.307
1857				121 18	4	9.04	4	7 = 7	34.307
1858				120 18	2	11.01	2	8′ = 8′	36.320
1859				118 5	3	9.86	1	8 = 8	36.337
1860				118 43	3	9.83	3	8 8	37.545

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1861	h. 4786 = γ *Lupi*	15 24	130 35	104 30	1	¾	0	3′ 3′	34.435
1862				95 23	2	do	0	3′ = 3′	34.465
1863				95 35	4	⅔	0	4′ 5	34.611
1864				100 34	2	0.74	1	5 5	35.120
1865				97 4	1	......	..	......	35.181
1866				93 2	2	......	..	4 = 4	35.353
1867				95 0	3	0.95	1	......	35.364
1868				91 1	2	......	..	......	35.424
1869				92 8	2	......	..	......	35.567
1870				94 43	2	1	0	4 4	36.178
1871				91 20	1	......	..	4 4	36.386
1872				95 36	2	......	..	......	37.140
1873				96 6	2	⅔	0	=	37.277
1874				97 13	2	......	..	......	37.309
1875				90 10	4	⅔	0	......	37.334
1876	h. 4788 = B. 5384. f. *Lupi*	15 24	134 23	347 58	1	3.06	1	4′ 9	35.567
1877				344 30	1	2.99	1	5 8′	36.386
1878				350 48	1	......	..	5 9	36.490
1879				350 49	2	3.37	1	5 8′	37.329
1880	Δ. 190	15 26	147 33	94 40	1	......	..	7′ 10′	34.307
1881	Σ. 1962	15 29	98 13	7 57	3	12.20	3	7′ 7′	37.545
1882	h. 4796	15 31	148 9	116 18	3	......	..	8′ 8′	36.304
1883				116 12	3	33.13	2	8 8′	36.419
1884				117 16	3	35.23	2	8 8′	37.326
1885	B. 5442. R. 20	15 32	154 54	153 35	1	2.65	1	7 = 7	35.307
1886				157 18	3	2.26	1	7 = 7	35.353
1887				155 11	3	2.34	1	7 = 7	35.364
1888	h. 4805 = B. 5484	15 37	142 41	129 33	2	33.32	1	6 11	36.419
1889				135 10	2	32.70	2	6′ 12	37.342
1890	B. 5486 = Δ. 193	15 38	144 32	22 26	3	23.99	1	6 10	35.367
1891				21 23	3	22.66	2	......	37.329
1892	h. 4809. ....A B.	15 39	150 10	50 55	2	43.47	1	7 9	36.244
1893	..................................A C.			257 2	2	49.30	1	7 9	36.244
1894	B. 5515 "double." Δ. 195	15 42	139 49	11 59	3	11.77	1	6′ 7	35.427
1895				10 31	3	12.84	2	8′ = 8′	36.490
1896				9 31	3	12.24	2	7 9	37.326
1897	B. 5535 + 5536. Δ. 196. ξ *Lupi*	15 46	123 28	50 2	4	10.79	3	6 6	34.304
1898				48 5	3	9.70	1	6 7	35.424
1899				49 27	3	11.71	3	6 6′	37.318
1900	h. 4821	15 48	121 32	145 31	3	17.30	1	8 8	35.452
1901				144 39	3	21.15	1	8 = 8	37.323
1902	B. 5554. R. 21. η *Lupi*	15 49	127 54	21 50	2	......	..	4 8	34.285
1903				23 28	4	15.12	3	4 8′	34.304
1904				20 53	3	14.92	1	4 9	35.452
1905	h. 4825 = B. 5559	15 50	147 17	251 41	3	9.21	1	5′ 10	35.427
1906				251 56	3	10.58	3	7 11	37.326
1907	Σ. 1998 = 51 *Libræ*. ....A B.	15 55	100 54	9 3	3	1.24	1	5 5	34.348
1908				7 34	3	......	..	7 7	34.550
1909				11 40	1	......	..	......	35.345
1910				10 56	3	1.58	1	5 5	35.364
1911				11 19	2	......	..	......	35.375
1912				8 39	3	......	..	......	35.400
1913				11 9	4	......	..	......	35.424
1914				11 24	3	......	..	......	37.334
1915	.... A C.	......	......	77 12	2	......	..	5 9	34.348
1916	σ. 506 = β *Scorpii*	15 56	109 20	25 28	2	13.11	1	3 6	35.452
1917				......	..	13.86	2	......	36.422
1918				25 59	3	13.70	3	3 5	37.476
1919	h. 4830	15 56:	132 32:	232 42	3	21.21	1	9 10	34.348
1920	.... Δ. 199	15 58	128 39	185 14	3	46.26	2	7 7′	34.304
1921				185 5	3	44.41	4	7 7′	37.537
1922	h. 4837	16 1	133 12	76 21	3	9.73	2	9 = 9	34.435
1923				74 33	3	10.60	1	9 9	36.416
1924	h. 4839. 12 *Scorpii*	16 2	117 58	82 17	4	4.13	2	6′ 10	34.348
1925				80 55	3	5.59	1	7 10	35.364
1926	h. 4840	16 6	124 23	293 0	2	5.79	1	9 10	36.320
1927				292 41	2	4.59	3	9 10	37.318
1928	B. 5699 = Δ. 200	16 11	133 30	198 32	2	43.50	1	6′ 10	36.487
1929				197 45	2	42.53	2	6 10′	37.381
1930	h. 4845 = B. 5708	16 12	130 50	136 38	1	1	0	7′ 8′	36.416
1931				133 22	1	1.20	1	8 9	36.487

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1932	B. 5709 ; ι *Triang Aus.* Δ. 201......	16 12	153 39	26 41	3	24.66	1	6′ 12	36.487
1933				27 55	2	......	..	5′ 11	37.545
1934	h. 4848..........................	16 13	122 48	155 28	5	5.78	1	7 7	35.424
1935				152 51	3	6.62	3	......	37.323
1936				156 24	3	5.55	3	7 7	37.663
1937	h. 4850..........................	16 14	119 18	348 14	4	7.38	4	7 7′	34.348
1938				349 20	3	9.20	1	7 8	36.320
1939				347 26	3	7.29	4	6 7	37.663
1940	h. 4853 (ε *Normæ*)..................	16 15	137 10	334 29	4	24.32	1	5′ 8	35.370
1941				336 52	3	23.61	1	5 6′	35.427
1942				334 37	3	23.80	3	5′ 8	37.460
1943	5 *Ophiuchi*.....................A B.	16 15	113 3	2 34	3	4.11	4	6 6	34.348
1944				1 42	2	......	..	......	35.433
1945	A C.	......	......	2 10	1	......	..	6 8	35.433
1946	A D.	......	......	286 35	1	......	..	6 8	35.433
1947	B. 5741 "double." Δ. 203 ?	16 18	150 30	250 5	2	36.51	1	8 8	36.389
1948				247 42	2	35.86	1	7′ 8	37.381
1949	Δ. 202 ?	16 20	131 28	180 25	2	58.48	1	6 11	36.643
1950	h. 4866 = B. 5770..................	16 26	146 39	126 32	2	3.51	1	8 8	35.370
1951				123 34	3	3.91	1	7′ 8	35.580
1952				127 32	3	4.11	4	7′ 9	37.334
1953	h. 4871 = B. 5781	16 27	137 26	46 55	2	26.88	1	7 9	34.479
1954				47 32	2	30.48	1	7 11	37.381
1955				47 25	1	27.18	2	7 11	37.457
1956				46 45	2	27.08	2	7′ 10′	37.482
1957				47 38	3	28.90	1	7′ 10	37.521
1958	h. 4873.	16 27	139 1	71 23	2	32.01	1	8 8	35.427
1959				71 38	3	31.80	2	8 8′	37.348
1960				73 17	2	31.74	3	8′ 9	37.381
1961	h. 4876 = B. 5792..................	16 28	138 25	264 38	2	9.34	1	6 7′	36.389
1962				265 25	3	9.95	4	6 7	37.381
1963	h. 4880..........................	16 30	136 3	151 0	2	31.86	2	8 11	37.348
1964	h. 4883 = Δ. 207	16 33	132 4	185 53	1	10.63	1	8′ 9	35.427
1965				184 56	2	11.30	1	8′ 9′	37.608
1966	Δ. 210	16 34	145 3	173 53	2	......	..	......	36.389
1967	B. 5841 = Δ. 209	16 37	126 34	148 0	2	25.96	1	7′ 8′	36.315
1968				147 18	3	28.90	0	8 8′	36.320
1969				146 10	2	23.56	1	8 8′	37.646
1970				148 30	1	22.18	3	7′ 8′	37.663
1971	h. 4889..........................	16 40	127 12	5 3	3	7.86	1	6′ 10′	35.320
1972				3 25	1	......	..	6′ 10	35.370
1973				6 37	1	6.73	1	6 9	35.452
1974	h. 4890	16 41	136 37	146 35	3	32.14	1	8 = 8	36.315
1975				148 58	2	30.71	3	7′ 7′	37.348
1976	h. 4896..........................	16 44	136 34	26 35	3	......	..	7′ 9′	36.238
1977				28 25	1	......	..	7′ 10	36.301
1978				29 22	3	4.39	4	8 10	36.487
1979	h. 4909 = B. 5931	16 51	140 50	284 13	3	16.55	1	8 8	36.386
1980				284 36	3	{ 17.66 { 15.72	1 2	} 8′ 9	36.646
1981	Δ. 213	16 58	136 31	164 36	3	9.37	1	8 10	36.301
1982				167 35	3	7.94	1	7′ 9	36.646
1983	B. 6009 (doubtful)..................	17 4	132 8	159 40	0	2	0	7 11	37.539
1984	36 *Ophiuchi* = Sh. 243	17 5	116 21	43 43	3	5.19	4	6 = 6	34.307
1985				43 34	4	4.80	4	6 6	34.348
1986				45 43	3	......	..	......	34.550
1987				43 7	4	3.66	1	6′ = 6′	35.375
1988				41 25	3	5.00	2	6 6	37.608
1989	h. 4938..........................	17 8	146 16	109 51	3	23.88	1	8′ 8′	34.309
1990				107 0	3	25.25	1	9 9	37.482
1991	h. 4939..........................	17 9	146 17	224 25	3	29.98	2	8 9	34.309
1992				224 18	3	31.57	2	8′ 10	37.482
1993	h. 4947..........................	17 14	171 47	74 57	2	10.76	2	9 9′	36.487
1994				75 59	2	10.38	1	9′ 9′	36.556
1995	h. 4949. B. 2072 = L. 1432. A B.	17 14	135 41	266 34	3	3.25	1	6 7	35.424
1996				267 7	3	4.01	1	6′ 7	36.315
1997				265 59	3	3.26	4	6 7	36.487
1998				267 6	3	2.75	4	6 7	37.381
1999	A C. (= Δ. 216)	......	......	313 55	1	104.57	1	6′ 7	36.315
2000				313 23	2	102.64	2	6 7	36.487
2001				313 20	2	106.21	1	6 7	37.381

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2002	B. 6085. Δ. 217	17 17	133 49	171 45	2	13.59	1	7 9	34.435
2003				170 16	3	14.79	4	6′ 9	37.453
2004	h. 4975 = B. 6193	17 34	145 20	115 42	2	2	0	7 11	35.367
2005				81 21	2	1.51	1	6 10	37.663
2006	h. 4978 = B. 6204	17 37	143 32	269 3	2	12.05	2	6 11	34.465
2007				270 0	2	12.36	1	6′ 11	35.370
2008	h. 4982 = B. 6210	17 38	138 13	60 23	2	43.69	1	7 9′	37.350
2009				59 17	3	42.52	2	7′ 10	37.460
2010	Δ. 219 = B. 6265	17 47	126 50	265 45	2	47.64	1	6 8	36.386
2011				264 25	2	46.55	1	5′ 7	37.350
2012	h. 5000 = B. 6267	17 48	126 55	106 28	2	5.73	1	7 11	36.386
2013				107 52	3	7.39	2	8 10	37.350
2014	h. 5003 = M. 8300	17 48	120 14	107 12	3	6.55	4	6′ 8	36.422
2015				107 3	2	5.49	2	5 7	37.460
2016	h. 5005 = B 6273	17 49	135 48	29 3	3	27.34	3	7′ 8	34.479
2017				28 0	2	26.34	2	7 9′	37.350
2018				27 30	3	26.57	2	7′ 10′	37.452
2019	h. 5013 = B. 6308	17 55	133 24	68 18	2	0.67	2	6′ 6′	36.422
2020				61 42	1	1″	0	6′ = 6′	36.487
2021				76 43	1	1″	0	6′ 6′	36.663
2022				70 3	1	∠ 1″	0	6 6	37.364
2023	A. 2082; 70 *Ophiuchi*	17 57	87 27	132 29	3	......	..	......	34.611
2024				129 30	3	7.19	2	5 8	36.646
2025				......	..	7.24	3	......	do
2026				129 0	3	6.51	2	5 8	36.663
2027				......	..	6.93	3	......	do
2028				129 41	1	......	..	5′ 8	37.476
2029	h. 5023	17 59	130 37	276 6	3	10.35	1	8 8′	36.301
2030				275 34	3	9.17	1	8 8′	36.711
2031				276 30	3	8.99	3	9 = 9	37.537
2032	h. 5025	17 59	130 39	100 8	2	48.74	1	9 9	36.301
2033				100 40	3	47.13	1	9 9	36.711
2034	h. 5032 = B. 6342	18 2	133 14	335 49	2	$1\frac{1}{2}$	0	7 10	37.663
2035	h. 5034 = B. 6349	18 4	136 4	91 20	3	1.92	2	8′ 9	36.501
2036				89 50	1	$1\frac{3}{4}$	0	8 10	37.452
2037				86 49	1	$1\frac{1}{2}$	0	8 9	37.482
2038	h. 5038 = B. 6361	18 6	161 51	300 28	2	10.26	1	9 9′	36.490
2039				300 17	2	10.66	1	8′ 10	36.504
2040				300 20	3	13.10	2	8′ 10	37.348
2041	Δ. 220	18 8	145 38	180 13	2	28.95	1	7′ 8	35.433
2042				179 50	3	32.57	2	7′ 7′	35.580
2043				179 37	3	31.51	4	8 8′	36.501
2044				178 50	3	32.06	1	8 8′	36.711
2045	Δ. 221 = B. 6386	18 12	134 11	164 30	2	76.94	1	5′ 9	36.501
2046				164 30	3	75.74	1	5′ 11	37.457
2047	Σ. 2306	18 13	105 11	35 30	3	13.06	3	8 = 8	37.479
2048	Σ. 2313	18 16	96 41	195 20	1	5.25	1	8 9	36.646
2049				198 47	2	......	..	7 10	37.479
2050	B. 6428 + 6479. Δ. 222	18 22	128 50	359 45	3	22.16	2	6 7	35.433
2051	κ *Coronæ Australis*			359 16	3	22.26	2	6 6	36.709
2052				358 45	3	21.49	6	6′ 7	37.537
2053	h. 5055	18 30	143 1	75 32	1	7.39	2	8 8	37.665
2054	h. 5056	18 31	145 50:	198 58	3	31.26	1	7 10	34.309
2055				198 44	3	33.02	2	7 10′	37.523
2056	B. 6514 + 6515. Δ. 224	18 41	137 28	63 53	3	82.66	2	7′ 7′	34.479
2057				64 3	2	81.55	1	7 = 7	35.433
2058				63 28	5	84.28	1	7 = 7	36.457
2059	h. 5075 = B. 6546	18 48	154 1	108 15	2	1.86	1	8′ 8′	35.454
2060				108 56	2	$1\frac{1}{4}$	0	8′ 8′	35.580
2061	B. 6556 "double."	18 50	127 17	282 30	3	12.98	3	7 7	37.663
2062	h. 5084 = γ *Cor. Austr.*	18 55	127 18	37 6	3	1.23	0	7 = 7	34.468
2063				37 2	2	......	..	6 = 6	35.433
2064				36 42	3	......	..	......	35.561
2065				34 28	3	3.67	2	6 = 6	36.427
2066				32 2	3	3.63	1	5′ = 5′	37.348
2067				33 55	3	2.76	2	......	37.444
2068				32 10	4	2.04	1	6 = 6	37.452
2069				32 41	4	2.40	3	5′ 5′	37.457
2070	B. 6591. Δ. 225	18 59	142 4	252 30	2	68.75	1	7 8	35.433
2071				253 23	2	70.00	2	7 8	37.444

Index No. for Reference.	Synonyms.	R A. 1830.0.	N P D. 1830.0.	Position with Meridian from N. by W.	Value attributed.	Dist.	Value attributed.	Magnitude.	Date of Observation. 1800+
2072	h. 1367. (right)	19 1	107 43	58 48	2	15.67	1	8 9	35.616
2073				63 44	3	14.69	2	8′ 10	37.526
2074	*β Sagittarii.* Δ. 226	19 10	134 46	78 3	2	29.55	2	5 9	34.465
2075				79 13	1	......	..	4 7	34.556
2076				79 3	1	28.62	2	5 8	36.553
2077	h. 5114 = B. 6656. A B.	19 14	144 39	130 57	1	$1\frac{3}{4}$	0	6 11	37.663
2078	A C.	......	......	270 40	1	69.43	1	6 7	37.663
2079	h. 5117	19 16	134 13	264 49	2	5.11	1	8′ 9	35.580
2080				266 44	1	4.63	1	8 10	36.504
2081				264 30	2	6.61	4	8 10′	37.539
2082	h. 5140	19 34	155 19	94 5	2	2.24	1	8′ = 8′	36.556
2083				86 35	2	1.24	1	9 9	36.715
2084				88 13	2	1.82	2	8′ 8′	37.539
2085	Δ. 227 = B. 6745	19 39	145 24	150 29	3	22.24	1	5′ 6	34.548
2086				151 10	3	24.38	1	7′ 8	34.550
2087				150 27	2	22.93	5	6′ 7	35.433
2088	B. 6566 + 6568. Δ. 229	19 45	142 21	243 27	2	81.99	1	7′ 8	34.479
2089				244 19	2	83.39	1	7 7′	36.504
2090	h. 5177 = B. 6812	20 1	147 28	29 51	3	6.87	1	8′ 9	34.548
2091				29 23	3	8.39	1	8 = 8	35.580
2092				28 28	2	8.90	3	8 8	37.539
2093	Δ. 230	20 6	130 42	115 26	3	11.85	4	7′ 8	36.504
2094				114 30	3	10.34	2	......	36.715
2095	B. 6857 = Δ. 231 ?	20 17	161 45	65 0	2	116.98	2	7′ 8	36.504
2096	Δ. 232	20 17	165 55	17 23	3	18.69	1	6′ 7	35.608
2097				17 35	2	18.90	3	......	36.504
2098				17 0	2	18.11	1	6′ 7	36.594
2099	A. 2404. *ρ Capricorni* = H. II. 51 =	20 19	108 22	177 20	2	4.39	3	5′ 8	35.534
2100	Sh. 323.			177 38	3	3.91	3	5′ 8	37.526
2101	Sh. 324. *o Capricorni*	20 20	109 9	239 23	2	21.35	3	7 7	35.534
2102				239 18	2	22.82	5	7 8	36.646
2103	h. 5204	20 20	135 55	34 20	3	7.08	1	8 9	35.608
2104				34 47	3	6.07	5	8 10	36.715
2105	B. 6917. R. 26	20 37	153 3	101 28	2	......	..	6′ 7	34.638
2106				101 17	2	3.23	1	7 = 7	35.556
2107	h. 5224 = B. 6922	20 39	124 23	164 31	2	21.71	1	5 11	35.608
2108	h. 5231	20 42	161 4	110 42	2	7.09	1	9 9′	36.553
2109				109 55	3	7.88	4	8 8	36.567
2110				112 14	3	7.14	1	7′ 8′	36.715
2111	B. 6953 = Δ. 236	20 49	133 39	255 10	2	59.79	2	8 = 8	36.556
2112				254 40	3	60.10	4	7 7	36.646
2113	h. 5252	21 2	105 43	328 50	1	2	0	8 8′	35.613
2114				327 6	1	2.12	1	8 8	36.641
2115	h. 5258 = *θ Indi*	21 8	144 9	307 31	2	3.65	2	5 10	34.468
2116				306 53	2	......	..	5 10	34.479
2117				302 27	2	3.71	1	5′ 9′	34.548
2118				309 42	3	......	..	5′ 10	34.550
2119	h. 5262 = B. 7009	21 10	170 46	92 53	1	33.34	0	6 11	34.775
2120				92 0	1	24.22	1	6 12	37.526
2121	h. 5267 = B. 7019. A B.	21 15	136 47	56 45	1	5	0	7 11	34.479
2122	A C.	......	......	183 25	1	......	..	7 9′	34.479
2123	h. 5278 = *λ Octantis*	21 23	173 29	83 28	3	3.00	4	5′ 9	34.717
2124				80 37	2	4.55	1	6 9	35.583
2125				83 55	3	3.57	2	6 9	36.422
2126	h. 5282	21 28	107 10	80 18	2	17.99	1	9′ 10	36.641
2127	h. 5284	21 28	107 4	268 55	2	51.02	1	8 10	36.641
2128	B. 7080 "double."	21 37	138 4	11 35	1	29.69	1	6′ 10	36.556
2129				15 3	3	30.51	3	6′ 9	36.690
2130	h. 5309	21 47	141 53	169 10	1	10.14	1	10 10	34.548
2131	h. 3071	21 48	105 56	318 30	1	19.79	1	7 10	35.613
2132				320 33	2	17.30	0	6 11	37.797
2133	h. 5316. A B.	21 55	149 54	142 15	1	2	0	8 10	34.550
2134				142 13	1	......	..	7′ 10	34.643
2135				154 25	0	......	..	8′ 10	35.608
2136	A C.	......	......	190 50	1	......	..	7′ 7′	34.643
2137	h. 5317	22 1	149 40	99 50	2	15.20	1	9 10	34.548
2138				100 30	3	15.86	1	8′ 9′	35.608
2139	h. 5319	22 2	129 9	111 31	2	1.87	2	8 = 8	34.693
2140				108 41	2	1.98	1	8 = 8	35.504
2141				110 10	1	......	..	8′ = 8′	35.580
2142				110 48	3	1.54	3	8 = 8	37.660

Index No. for Reference.	Synonyms.	R A. 1830.0.	N P D. 1830.0.	Position with Meridian from N. by W.	Value attributed.	Dist.	Value attributed.	Magnitude.	Date of Observation. 1800+
2143	B. 7154 + 7155. Δ. 238	22 11	165 52	83 43	3	18.44	2	7 9′	35.914
2144				82 8	3	17.39	1	6′ 10	36.567
2145	h. 5334 = *δ Toucani*	22 15	155 50	282 11	3	6.78	2	5 11	35.608
2146				282 30	3	6.97	1	4′ 10′	36.711
2147	B. 7173 *δ² Gruis.* Δ. 239	22 20	134 37	215 35	3	61.46	1	5 9′	36.567
2148				215 51	3	61.20	3	5 10	36.646
2149	*ζ Aquarii*	22 20	90 53	352 23	3	3.55	1	......	35.550
2150				352 0	3	3.42	2	......	36.564
2151				351 34	3	4.18	5	5′ 5′	36.646
2152	B. 7176 "double." Δ. 240..........	22 22	123 13	173 10	3	30.33	2	4′ 7	35.761
2153	*β. Pisc. Austr.*			173 21	3	28.27	3	4′ 9	36.646
2154	Δ. 241	22 27	122 33	30 40	3	87.01	1	6 7	34.780
2155	h. 5354..........................	22 29	148 43	71 40	1	43.64	1	9 9′	34.548
2156	B. 7190 + 7191 = Δ. 242....... A B.	22 30	119 14	160 20	2	85.31	0	6 7′	36.641
2157				159 15	2	......	..	......	37.652
2158				159 20	1	......	..	6 6′	37.660
2159	h. 5356 = do. the smaller star double; B C	......	......	59 21	2	4.30	1	7′ 9	36.641
2160				56 9	3	4.61	2	6′ 9	37.660
2161				58 4	2	4.13	2	7 9	37.797
2162	Σ. 2943	22 39	104 55	113 40	3	30.86	1	6 9′	35.761
2163	h. 5367 = B. 7218.................	22 43	123 47	276 50	3	3.59	1	4′ 10	35.550
2164	22 *Pisc. Austr.*			276 38	2	......	..	5 11	35.556
2165	h. 5373..........................	22 50	155 11	99 35	3	48.89	2	7′ 10	36.567
2166	Σ. 2970	22 54	102 12	36 18	2	8.87	3	8′ 9	37.797
2167	B. 7246 = Δ. 246	22 57	141 36	260 15	3	......	..	6 6′	34.638
2168				260 58	3	7.96	1	7 8	34.772
2169				260 24	3	8.17	3	6′ 7	37.663
2170	Δ. 245	22 58	150 39	290 4	3	15.62	1	7′ 9′	35.608
2171				292 16	3	14.93	4	7′ 10	36.711
2172	Σ. 2988	23 2	102 50	100 15	2	3.43	2	7′ = 7′	37.797
2173	Σ. 2993	23 5	99 51	356 44	3	25.74	3	7 7′	37.797
2174	σ. 776	23 7	100 0	311 28	3	49.29	3	5′ 10	37.791
2175	h. 5392 = B. 7270.................	23 9	149 14	17 57	2	......	..	7′ 9	34.643
2176				21 30	2	6.96	1	9 10	35.914
2177	Σ. 2998	23 11	104 22	343 37	2	14.75	2	6 9	37.791
2178	B. 7276. Δ. 248	23 11	141 14	210 7	3	17.66	2	6′ 10	36.567
2179				212 14	3	16.64	3	6 9	36.646
2180				212 27	2	16.42	2	6 10	37.808
2181	B. 7280 + 7281. Δ. 249. *ψ Gruis* ..	23 14	144 45	213 18	3	26.81	2	6 6′	34.641
2182				213 45	4	27.45	2	6 8′	35.580
2183	Σ. 3008	23 14	99 24	90 15	2	6.88	2	7′ 8	37.797
2184	h. 5397..........................	23 15	105 25	329 57	2	61.76	1	7 9	35.761
2185	h. 5403 = B. 7301	23 25	155 38	47 11	3	43.09	2	7 10	34.693
2186				49 17	3	41.48	1	6′ 10	36.646
2187				48 46	3	42.34	2	7 9′	36.711
2188	B. 7314 + 7315; R. 27; Δ. 251	23 30	137 35	268 16	3	4.30	1	6 6′	34.717
2189	*θ Phœnicis.*			269 33	4	4.72	1	......	34.772
2190				268 7	2	4.44	3	6′ 7′	37.660
2191	B. 7342 "double."..................	23 46	117 59	267 45	2	6.92	2	6′ 7	34.780
2192				267 20	2	6.79	1	......	35.556
2193	h. 5435..........................	23 48	107 6	2 45	1	12 ±	0	9 9′	35.761
2194	h. 5440..........................	23 54	118 4	285 5	2	3.63	2	8′ 9	34.780

NOTES TO ACCOMPANY THE MICROMETRICAL MEASURES OF DOUBLE STARS.

1113 Distance by thick wires without cross zeros, corrected as per table.

1114 An oblique transit (in which there must have been some error in setting the micrometer wire) gave by 4 transits 74″.80 for the distance, which is rejected.

1115 Distance by 6 oblique transits taken with great care.

1117 Distance by 5 oblique transits, great care taken.

1121 Distance by 4 oblique transits over a wire 5° inclined to the parallel, which is too small an angle for the purpose, the zero uncertainty having too much influence. In consequence the observation is allowed only half its value.

1122 All possible care taken with the distances, and by nice management of the micrometer screwhead, all hitching of the threads avoid in the crossing. (The screwhead being *drawn towards the eye.*)

1123 The wires were purposely set to 170° (the mean angle of sweep 484) but it proved intolerable.

1126 Distance scarcely obtainable, but a little illumination improves the object.

1127 Very difficult, especially in distance.

1128 Bad night, will not bear the least illumination. No distances could be procured.

1129 Distance between thin wires and the screwhead of the micrometer being drawn towards the eye in crossing, no hitching of the threads took place.

1133 Distance by 7 oblique transits.

1134 Micrometer set to 78° 30′, the mean measure of 1835.920: it is now certainly no measure. The star has surely changed. Distances *close clipped* between the thick wires.

1135 Distance by 5 differences of R A.

1136 Distances by 9 oblique transits over a wire 10° inclined.

1139 Stars excessively furred but with distinct centres. At least half the light goes to the furring.

1143 Distance by 3 oblique transits.

1144 Very strong S.E. wind, steadiness and definition perfect. No fiddling of wires, but all excellent.

1145 Grew unsteady before measures could be completed. Distance a mere guess—one measure only on either side of the zero.

1146 Extremely delicate, but bears a fair illumination.

1148 A very delicate and beautiful object. Definition good but creeping.

1149 Definition blurred, but the threads do not fiddle.

1152 Very close, distance estimated at $1\frac{1}{4}''$.

1154 Thick hazy sky, but good definition.

1155 Strong S. E. wind but steady and well defined.

1156 Will not bear power No. 3, though near the zenith.

1158 Micrometer set to Mr. Dunlop's measure 15″.8. Both discs are broadly included between the wires with an interval on either side.

1161 Very bad definition, stars furry with tolerable glimpses, perfectly steady however.

1164 Well defined, perfectly steady—a fine double star; excellent measures of position.

1165 Delicate. Tremulous and furred.

1167 The star will not remain quiet. This star must be verified, though after nearly three-quarters of an hour's attention I feel assured the small star is no illusion. The power No. 4, leaves hardly a doubt, and admits of measure in position, but the night is not good enough for such delicate work. [N.B. Brisb. makes P D = 129° 16′.]

1169 Very good definition and perfectly steady. The position must be within a degree of the truth.

1170 Good and steady definition. Distance by 6 differences of R A.

1171 Very difficult, too faint for the instrument. Distances quite rough.

1173 A faint object, but in a good night not difficult. Not well defined.

1174 Perfectly steady, tolerably defined.

1179 Too difficult for the instrument, especially in distance.

1182 }
1183 } One hundred parts error being suspected in the micrometer reading, (which being supposed) gave 61″.55 for the distance, 3 differences of R A were taken, not very satisfactory, whose mean gave 66.32, thus establishing the supposed omission of 1 Rev.

1184 Extremely difficult, a 20-feet object.

1186 Definition confused, star not very steady.

1187 Definition perfect, stars very steady, and both position and distance noted as excellent.

1191 Definition wonderfully fine. Distance difficult, the position being so near the parallel.

1193 After taking the position, it grew ill-defined, and no distance could be got.

1196 Delicate. Requires the strongest illumination the lamp will give to see the small star. Some suspicion of elongation in the large star.

1197 Dense haze and cirro-cumuli, which evidently affect the estimations of magnitude, which must be rejected in taking means.

1199 Distance by 4 oblique transits over wire 10° inclined to parallel.

1201 Well seen by very short glimpses in the drift of a black south-easter. Clouds thickening.

1203 Distance by two sets of oblique transits, 3 each over wire, inclined respectively 10° and 20° to the parallel — the former giving 21″.20, the latter 19″.82; mean 20″.51.

1204 Full moon. Superb and cloudless, not a trace of a cloud on the mountain. (N.B. How often the full moon nights are so!)

1206 All excellent.

1207 The distance irregularly taken by using the left hand edges of each of the thick wires, a method admitting of no satisfactory zero being applied. The result is of course of no value.

1212 Distance by 2 oblique transits over a wire 10° inclined.

1213 Distance by the faulty method noticed in No. 1207; no value.

1214 Distance by 4 differences of R A.

1215 Excessively difficult in distance.

1216 Perfect definition and steadiness, rather difficult in distance, but bears illumination pretty well.

1217 Steady, and definition superb, distance difficult, and a tendency to cloud to westward.

1228 Distance by 6 oblique transits over a wire 10° inclined. No other mode of measurement would give a satisfactory distance of such a star.

1229 Difficult in distance; very steady, pretty well defined.

1230 Extremely difficult in distance, but great pains taken.

1231 Small star certainly seen, but far too difficult. Distance by 5 unsatisfactory differences of R A. Requires illumination.

1234 Bad definition, came on before the distances could be completed.

1239 Measured with the lowest power. Will not bear magnifying.

1240 Ill defined, and in consequence not bearing illumination—therefore difficult in distance.

1242 Very difficult in distance for want of light.

1243 Ditto.

1244 A difficult star, especially in distance. Very steady.

1245 Distance by 4 oblique transits over wire 10° inclined.

1247 Glimmering, but perfectly steady. No sign of fiddling in the threads or crossing.

1248 Too difficult. The night will not permit the use of higher power than No. 2.

1249 Very difficult. Power No. 1 (the lowest) used.

1250 The polar distances of this star disagree 10°, 115° is probably the right.

1251 Distance by 5 unsatisfactory oblique transits.

1253 Very steady, but glimmering.

1254 Steady, but glimmering. A superb sky *and full moon*, but the night is not good enough for this star.

1259 Difficult. Perfectly steady, but not well defined.

1261 In a cirrous haze, of which two systems at right angles to each other have come on.

1264 A third star C, 2′ ± distant is situated a very little following the line A B prolonged.—C = 9 m.

1268 Full moon very troublesome.

1269 Very bad definition, the large star not separated.

1275 Much of the object glass cut off, being past meridian, and near the zenith. A third star 9 m seen making nearly an isosceles triangle with the other two, and preceding both.

1276 Clouded densely over before more than a single distance could be taken.

1278 Three oblique transits gave dist = 43″.13, but there must have been some mistake in setting the wire.

1279 Distance not measurable to-night. A single rough measure only, of no value, procured.

1280 26″. The measure of 1279 is certainly too much—no *measure* is possible, but 18″ is the outside allowable.

1281 Distance by two differences of R A.

1287 Violent gusts of wind from S. E. or S. Steadiness and definition (with the lowest power) perfect.

1290 Too difficult.

1291 Wind gusty; definition not good.

1292 Both stars, perhaps, ruddy, but too faint to see the colour well, yet I do think they are redder than ordinary.

1293 Both stars pale pink, bearing good illumination, and improved by it. Definition glimmering, and will not bear No. 2; blurred and moulding.

1294 Wants light.

1305 Sky clouding and clearing alternately. Perfectly steady, and well defined.

1306 Well defined, and perfectly steady.

1307 Much improved by a pretty strong illumination.

1311 Distance by two distinct series of measures with powers No. 3 and No. 4.

1312 Two other stars C = 10 m and D = 9 m near. Distance of D = 3′ 26″.8. That of C about one-third of this.

1320 Too ill defined for any measure of distance.

1322 *Full moon.* Superb sky; a N. W. cloud over Table Bay.

1323 Triple. The nearer star B bears great illumination, the farther C does not.

1324 Sky alternately clearing and clouding, — at last clouded over.

1330 Dancing, trembling, and glimmering.

1332 Position wire set to 72° 40′, but it cannot be borne. The star has certainly changed. [Mr. Dunlop's position is 11° 12′, which is probably a mistake of reading.]

1336 *Moon apparently full* (it was full yesterday at 2 P. M.) A superb sky—not a trace of cloud.

1339 Certainly divided, but far too difficult a star for this instrument except in the very choicest opportunities. Position almost conjectural—a single measure. Distance estimated.

1340 Extremely close. Unmanageable from bad definition.

1341 Measures obtained with the utmost difficulty, two only got, which cost upwards of half an hour. Obliged to use the left eye, which in moments divided it. The right of no use at all.

1342 Orange and green, fine contrast of colours.

1343 Ditto ditto.

1346 γ Pisc. Volantis. A high yellow. B pale blue.

1350 Does not bear magnifying. No. 2 allows the stars to be sharply seen, but is barely sufficient to divide them. With No. 3, furred.

1351 Stars glimmering and "crabby." Does not bear No. 2 well.

1352 At first very ill seen, but by degrees better, at last pretty well. A distance of 5″ is out of the question.

1360 Difficult. Required extreme patience and frequent re-examination of measures. The preceding of two double stars nearly on the same parallel.

1372 The small star bears a reasonable illumination. Steady, but ill defined.

1373 Difficult in distance.

1381 Distance by 6 oblique transits over a wire 10° inclined.

1382 Definition the finest imaginable.

1386 Distance by 5 oblique transits.

1387 Far too difficult in distance, and liable to great error.

1389 Distance by 3 oblique transits.

1390 Patience and perseverance required. Star moulding, but good glimpses.

1392 Found in sweeping unsuccessfully for Δ. 59.

1395 Distance quite impracticable, even with power No. 1, even with the thick wires, as it bears no illumination. With No. 2 and the thick wires it succeeds better.

1398 Far too difficult for this instrument. A 3d star C seen at about 40″, 10 m.

1401 Found in sweeping for Δ. 61, which this assuredly is not.

1402 In a very rich part of the heavens. Many more stars in the field.

1404 In the preceding part of a great cluster.

1407 In a fine cluster.

1412 Clouded suddenly, and cleared again. It is the following of two stars B 1884 and 1887.

1418 Distance by 8 differences of R A.

1419 In strong morning twilight, and excessively fatigued with 7 hours' work.

1427 Distance by 5 oblique transits, taking alternately the disappearances and re-appearances of the stars behind the two thick wires placed close together. A very satisfactory procedure, the field being perfectly dark.

1429 Bears an illumination sufficient for measurement of the position, but is too difficult in distance.

1430 Besides the two double stars (A B and E F) measured in this and No. 1433, there is another pair, C D, whose position (by a single measure) = 206° 30′ and whose distance is considerably greater than that of A B. A B C D together make up the group Δ. 67, which he describes as four stars "forming a parallelogram." It is in fact a very irregular trapezium. Distances by oblique transits over wires included 10° and 45°.

1431 Requires pretty strong illumination.

1432 Bears and requires a full illumination.

1438 Taken in broad morning twilight; no lamp-light required.

1439 The line of junction prolonged passes through a 3d star 8′ m.

1440 Very close, and extremely difficult. Great patience required for procuring the angles, but no distance can be bad. Estimated at 1″.

1444 Too ill defined for any measure of distance. Roughly estimated at 6″.

1445 Distance of no value; cloud rising and obscuring the small star before the bisection was complete.

1450 Clouds prevented measures of distance. Only one obtained.

1454 The s p of two stars forming a coarse double star in the finder.

1456 A close and difficult star, being ill defined.

1457 If there be any reliance to be placed on the measures of 1456, this star must have changed considerably.

1458 Too difficult for to-night.

1459 Ill defined, and unsteady.

1461 Distance by 3 oblique transits over a wire 10° inclined to parallel.

1462 An error of 10° obviously committed in one of the micrometer readings; corrected before taking their mean. I cannot explain the great discordance of the measures of distance, unless another pair of stars near it has been measured by mistake.

1464 Too close for the low power, and will not bear a higher—all confusion.

1465 Definition much improved, and in consequence the measure of this star repeated.

1466 This star must have changed, and the measures must be repeated.

1473 Deep red illumination resumed after long disuse.

1475 In strong morning twilight, just before sunrise.

1477 *Full moon* (at 7 A.M. this morning). Sky perfectly cloudless to-night (with exception of the usual covering of the table mountain), after a fortnight of calm cloudy weather, with rain.

1480 Will not bear the necessary magnifying power. Only a single measure of position and an estimated distance.

1484 Excellent views obtained by long and patient waiting.

1487 Extremely close and difficult. *Hardly* a doubt, but it requires to be most scrupulously verified. It is an object for the 20 feet.

1488 ζ Octantis. I can hardly believe the companion star to be an object-glass illusion. Diagrams and measures taken with the object-glass in its usual position, and turned 90° round. Both agree in placing the small star s f, and though the measures differ 9°, it is not more than the closeness and inequality of the stars will admit of.

1490 Not the smallest occasion to re-measure this star. Distance by 8 differences of R A.

1493 Measured in company with Mr. Smyth, but his measures not used in casting up the mean.

1494 Another set of measures taken alone.

1496 Night growing bad, good views growing short and rare.

1499 Several other stars in the field. Too coarse and on that account difficult in dist.

1504 Will not bear the illumination necessary for procuring a good distance.

1505 Will not bear magnifying beyond No. 2.

1507 Too difficult in distance, as it becomes violently agitated.

1512 Difficult both in pos and distance, owing to the great difference of magnitudes.

1514 Position is better measured than dist, the definition growing worse.

1515 Dist by 6 differences of R A, and 4 measures with cross zeros.

1516 Dist by 5 differences of R A, which for a star so near the pole is the best mode of measurement for such an angle of position.

1517 Dist by 3 differences of R A.

1518 Dist by 3 *very doubtful* differences of R A.

1519 Dist by 8 differences of R A.

1521 Dist by a single measure, and that misread by 1 revolution (corrected in reduction).

1522 Distance most careful, after many trials and rejections.

1523 Not very easy, but bears illumination.

1525 Distance by two oblique transits, but too difficult.

1526 Distance by four oblique transits, but no sort of confidence in them. The star is excessively difficult.

1527 Too ill defined for any good measure.

1528 Well divided in good glimpses, but difficult.

1531 Most beautifully defined. The small star conspicuous in a fully illuminated field.

1535 Will not bear sufficient illumination.

1536 Distance rough, the lamp being almost out.

1543 Clouded thickly before distances could be taken.

1547 Stars burred, and not very steady.

1549 Burred. Too difficult in distance to-night.

1550 A calm, hot night. Tolerably defined, but catching.

1551 The larger of these two stars seen with the right eye through the telescope, is equal to η Argus seen with the left eye directly.

1553 Bears illumination, but is difficult.

1555 Morning twilight coming on.

1556 Another double star seen south of this.

1561 Found in a fruitless search for Δ. 92. It is the nearest to his place and description I can find. [It cannot be Δ. 92.]

1562 Distance by 6 differences of R A.

1563 A close star suspected 3″ dist, pos 81°.0, 11 m. [But this cannot be Mr. Dunlop's star (Δ. 97), as he makes both magnitudes 7.] *This companion was evidently an illusion, as it was not seen in the 20 feet, nor in any of the subsequent equatorial observations.*

1566 The chief star of a cluster of large stars.

1567 The star O in the monograph of η Argus, which see. Very difficult.

1569 No measure of distance possible, but estimated at $1\frac{1}{2}''$.

1571 Distance assuredly too great.

1572 Distance fair enough.

1573 Distance certainly too small. Very close, however, and a difficult star. [N.B. The mean of the distances of 1571 and 1573, which are faulty opposite ways, gives very nearly that of 1572.]

1574 } These measures are reduced to the middle point of
1576 } A and B, by applying to the measured positions of A B the correction + 0° 44′, and to the measured distance + 1″.12, which results from a collation of all the measures. In obs 1575, the measures were taken at once from C to the middle point of A, B seen as one star.

1577 Distance impossible; a rough and conjectural measure of 35 ± micrometer parts was declared not worth casting up.

1578 Distance by 9 oblique transits.

1580 Too difficult for any measure of distance.

1583 The star is coarsely triple. C estimated to be $2\frac{1}{2}$ times farther from A than B is.

1584 Too close for No. 3 power, and too faint for No. 4, and not well enough defined. Belongs to the pervicinæ. The measured distance 1″.42 is too large.

1586 Very delicate. Requires great patience and *strong illumination.* Definition perfect.

1588 An extremely close double star, and almost exactly on the parallel, which makes it difficult to measure.

1590 Definition at first tolerable, but rapidly growing worse. Too difficult for a measure of distance.

1593 Both stars decidedly red.

1594 Both ruddy.

1595 This star is beautifully triple, a very good resemblance of what ζ Cancri one day was, and one other day will be. Came on suddenly ill defined, and no measures of the close star could be obtained. On the back of the paper stands the following memorandum:—" If ever I saw a close double star in my life, I saw this *as* one. I went in and mentioned it to ———, and then came out to measure it. It was *then* most beautifully distinct (*i. e., after* I returned). I got my pencil ready, and laid out the lens to read off, and, looking again — the close star *was gone.* After this it grew rapidly ill defined, and I lost a full hour in working against the faults of the atmosphere in vain to recover my lost star. At last it grew all confusion, and I gave it up. This must be re-examined with all possible care, as it is quite unaccountable."

The diagram makes the position of the illusory star about 332°. I have often examined it since. There is no close star. It must have been an illusion, but a very odd one.

1596 The supposed triplicity of this star is, I believe, an illusion. It wants the 20 feet to decide. [*The star has occurred twice, in* ʃ 542 *and* 554, *but in neither observation is any close star mentioned. See Catal.*]

1601 A single measure, got by great patience. The small star is certainly s p.

1605 A beautiful object (β Hyd. Crat), very like ξ Ursæ, but closer and a little more unequal.

1609 Set micrometer (with all due attention to the zero) to pos 337° 45′. It cannot pass. If the angle ever *was* 337° 45′, the star *must* have changed.

1610 Morning twilight coming on.

1613 Clouding and clearing during the measures.

1615 Far too difficult for this instrument in distance.

1619 Difficult in position. In distance hardly practicable.

1622 Wants light. The distance very precarious.

1624 } Elaborate sets of distances taken, but an eye-piece
1625 } used for which I have no data for casting up the measures.

1627 Beautiful discs, but trembling like drops of mercury.

1629 The small inequality of the discs increases the difficulty of getting correct measures.

1635 Taken while the discs were dwindling under the influence of a black south-east cloud, which at length reduced them to nothing and extinguished the stars.

1637 Working vehemently, but good centres which keep their places.

1638 Extremely agitated.

1640 } 1646 } Morning twilight.

1645 Quiet at first, but at the end of the measures very bad, working, fluctuating, and confused.

1648 γ *Centauri.* Extremely close and very difficult, at least as close as γ *Virginis;* 273 barely elongates it.

1649 Certainly double, but far too difficult for this telescope. Distinctly elongated, but the measures of no dependence.

1650 Far too difficult for *satisfactory* measures; yet I must believe these to be somewhere about the truth.

1651 A better set of measures than hitherto got with the equatorial, but it is too difficult for this object-glass.

1652 Certainly seen double, *i. e.* elongated with parallel fringes.

1654 Excessively close and difficult, but the power No. 4 will act to-night, though not quite so well as I could wish. Field strongly illuminated.

1656 Tolerably elongated with No. 4. Brandishes, dances, and spreads, yet occasionally an elongated centre caught.

1660 Measured with Dollond's new compound achromatic eyepiece. Dreadfully ill-defined, spreading and agitated. (Nine measures taken.)

1661 The utmost patience required, as the star will not keep a moment still; moulds, twirls, dilates, and all that is horrible. At times becomes a diffused mass—a mere nebula. (Ten measures taken.)

1662 Tolerably defined. Discs in contact. (Nine measures taken.)

1663 Excessively ill-defined. (Two measures taken.)

1664 Definition bad. (Six measures taken.)

1665 Pretty well defined. (Ten satisfactory measures of position, and 8 tolerably so of distance.)

1666 Very ill defined, dancing violently. (Seven measures.)

1667 Passable definition. In twilight. (Eight satisfactory measures.)

1668 Definition generally bad—but in good glimpses 6 tolerable measures.

1669 Ill defined, among clouds, but with great patience got 5 tolerable measures.

1670 Ill defined—excessively difficult—yet I feel assured that pos 40° (50° *microm reading*) is too large (*small on micr*) an angle, and 30° (= 60° *micr*) nearly right.

1671 Not well defined, and unsteady. (Five measures.)

1672 In broad daylight, just after sunset. Definition bad and exceedingly unsteady. Glimpses interrupted by total confusion.

1673 These are by far the best measures (of this star) I have had at the Cape. Their discordance arises not from atmospheric influence as in all the former measures, but from the exceeding closeness which renders the oval of elongation (power 400) too nearly a circle to admit of a good judgment of the direction of the axis. Good definition, perfect steadiness of centres; 10 measures taken, difference of greatest and least = 11° 35′.

1674 Four measures taken, 3 of which (allowed double weight) were made when the star was very tranquil and quietly contemplated, the only time I have even seen it thus here.

1675 Firm good glimpses. Discs very small and fairly divided, (in the midst of much flare) [*caused by throwing the eyepiece a trifle out of focus*] (2 measures.)

1676 Fairly seen, and a *real* set of measures. (Five measures taken.)

1678 The utmost patience necessary to procure these measures [5 *in number*] and they are extremely unsatisfactory. Definition very bad.

1679 A wedge. Bad definition, but glimpses obtained [5 *measures*].

1680 Two measures. The last decidedly a good one. [Difference 0° 20′.]

1681 Two bad measures. Quite unmanageable; yet taken 1^h past merid at 3^h A.M., thinking it a peculiarly favourable opportunity—but it dances, twirls, and makes all manner of distortions.

1682 The best set of γ Virginis I have got since my residence at the Cape, and deserving confidence. Six measures. Very fair definition and steadiness. The distance is less than 1″.

1683 Very conspicuously wedge-formed. Unequivocally elongated. Twirls, moulds, dances, and wriggles in a most violent manner, but preserves an elongated disc. [*Three tolerably good measures taken.*] There is no doubt or hesitation *now* about the star being double. Estimated distance of centres two-thirds of a second.

1684 Quiet, but furry, and not worth measuring. Only a single measure, and that of no value, procured.

1686 *Night after the full moon.* Not a cloud to be seen. Calm. Steadiness perfect, but the star glimmers.

1688 Very difficult.

1689 Too faint for direct measures of distance. Three good oblique transits by disappearances and reappearances.

1690 Steadiness and definition perfect.

1699 Ill defined and unsteady.

1700 Perfect definition and steadiness.

1705 By far the closest double star I have *seen double* in this instrument. I have no doubt, but should like to see it in the 20 feet. Night *perfect.* Power No. 4, perfect in its action.

1706 Found in a fruitless search (for the third time) for Δ. 132.

1707 Distance impracticable, owing to bad definition.

1713 Glimmering, but steady. Good measures.

1715 The two stars run along so nearly bisected by the true parallel, that it is hardly possible to say which is the northern or southern.

1717 Faint, and difficult in distance.

1718 Rather too faint for measures. Difficult in distance. Glimmers.

1719 Observation interrupted by clouds.

1723 It makes a moderately small angle with the parallel (19°±). Mr. Dunlop's angle is quite erroneous. All carefully re-examined before unsettling the instrument.

1724 Very bad definition, working, a N.W. wind beginning to stir.

1726 Distance by patience, in intervals of clear sky, growing murky. Definition and steadiness perfect.

1729 *k Centauri.* Halley's comet close to the star, and almost in contact with it.

1731 Perfect steadiness and definition.

1732 Superb sky, but the stars furred.

1735 Found in looking for Δ. 151, which could not be found; but this star [*which cannot be* Δ. 151] stands very nearly in the place assigned to that object, and must have been in Mr. Dunlop's field of view had his instrument been really pointed to that place.

1737 Mr. Dunlop's position for Δ. 151 is 90° *north from parallel*, I can find no other double star hereabouts.

1740 Bears a pretty strong illumination.

1746 Difficult.

1747 Distance by 3 oblique transits.

1748 Carefully examined the thin wires. They pass freely.

1750 Wolves howling very near, at the end of the south avenue or in the grounds.

1751 Excessively difficult for want of light and the necessity of magnifying. Telescope left long at rest.

1752 Very close—too difficult for this instrument.

1754 Found in a fruitless search for Δ. 170 which does not exist.

1755 Distance too difficult. Object-glass dewed certainly.

1756 *α Centauri.* The first trial of the 7-feet equatorial in its new situation at Feldhausen. Tolerably steady, but ill defined; between clouds.

1757 Well defined, but working and not quite steady. B is certainly greater than 4 m.

1758 Fine definitions but tremulous. A pale yellow, B higher yellow.

1759 Very well defined, but unsteady.

1760 Both superb yellow, inclining to orange. There is a shade of difference. The smaller star has certainly a higher colour than the larger. Fine definition, but very tremulous.

1761 A pale yellow. B rather a deeper shade of yellow. Fine discs, but *shuddering.*

1762 *The distances with the inner edges of the thick wires, the thin ones being now utterly deranged and useless.*

1763 A yellow, B yellow inclining to brownish or orange. I cannot imagine finer measures. [*Inner edges of the thick wires used, and so continued.* N.B. *Till and inclusive of* No. 1770.]

1765 A yellow, B deeper yellow. Tremulous and brandishing.

1766 Working and furred.

1767 Four oblique transits over a wire 5° inclined gave 15″.81 for the distance. But this inclination is too small for practical use.

1768 A yellow, B pale orange. Working violently, but good centres.

1769 The stars are balls, not discs, yet small and well concentred, but furiously *working* within their own limits.

1770 The stars reduced to 7th, 8th, &c., magnitudes, until extinguished by dense cloud.

1771 The centres not seen, but the stars *work inwardly in close rapid vibrations,* giving fuzzy or bushy pellets.

1772 The thin wires and cross zeros for distance resumed. Working and brandishing.

1773 A yellow, B brownish-yellow, a dull yellow inclining to orange. Very difficult to measure by reason of the great size and brandishing of the discs.

1777 Fine definition. Tremulous, but the measures excellent.

1779 A fine yellow, B brownish-yellow. Working furiously and dilating. [N.B. *General note on the measures of α Centauri from* No. 1762 *to* 1770 *inclusive. The distances are peculiarly affected by the change of the micrometer wires from the thin ones with cross zeros, to the thick with inner contacts, and require a special discussion, which see further on.*]

1780 Too faint for good measures.

1782 Requires strong illumination.

1786 *Full moon at* 7 A. M. *this morning.* Not a trace of cloud in any part of the sky, after a fortnight calm cloudy weather.

1788 At first clear, but a fog or light cloud-drift from S.W. came on after the first 2 or 3 measures of position. A bright halo about the full moon. It cleared off and the measures were completed satisfactorily.

1790 Steadiness and definition perfect.

1791 Found while searching in vain for Δ. 174. Distance extremely difficult with the thin wires.

1793 Far too difficult with this instrument, but certainly divided in momentary glimpses.

1794 Very difficult in distance.

1795 Barely discernible as a separated double star with No. 2. Hardly better seen with No. 3 for want of light. Came on ill defined.

1804 Large star ruddy, small also reddish.

1806 *π Lupi.* Suspected with 273, verified with No. 4. A hair-breadth division, or at least a deeply-notched disc by glimpses. Is of the order pervicinæ.

1807 Excessively close and difficult star, but well seen double.

1808 I do not think better measures will be got of this star with this instrument. Disc distinctly, in best moments deeply, notched.

1809 Excessively difficult. It is closer than γ Lupi, for the discs are smaller, and yet it is not even so much divided.

1810 Not sufficiently well defined. Too early in the night.

1811 *π Lupi* is certainly far more difficult than last year. It was by no means a *very* difficult star when first discovered. Now it is barely, but certainly, elongated "ex æqualibus." [N.B. *However, in this obs. the power* No. 3 = 273 *was used.*]

1812 Excessively close, but well separated with No. 4, and the measures very satisfactory.

1813 I am not sure that this star is not closer than γ Lupi. The discs are smaller, yet not (I think) proportionately more separated. Altogether it is quite as difficult. A black line of separation seen. Definition very fine, and steadiness perfect.

1816 *Moon to the eye full.* (*Is full by almanac at* 10 P. M. *to-morrow.*) Night calm, serene, and perfectly cloudless.

1817 Glimmering, difficult in distance with thin wires.

1818 Capital measures.

1819 *μ Lupi.* No. 3 elongates it decisively, No. 4 divides the discs clearly by a perceptible black line. It is not so close as *π* or *γ* Lupi, and is much wider than *γ* Centauri. Attempted distance by transits over a wire 8° inclined, but variable refraction, and the closeness of the stars, rendered the result (3″.5) not worth registering.

1824 Pos of C *taken* from the middle of A + B.

1825 Pos of C from the middle of A, B. Distance from A, reduced to middle by calculation.

1826 Pos and dist of C from the middle.

1827 Pos and distance both measured from A (reduced to middle) so as to render all the measures comparable *inter se.* [N.B. The reduction to the middle point of A + B, has been made where needed in the series 1824, 5, 6, 7, by applying to *distances* measured from A, the correction —0″.68, and to positions so measured the correction — 1° 42′ derived from a general collection of the whole series of angles 1819....1827.]

1828 An attempt made to measure the distance by a process of repetition, reading off at once the sum of several distances between the edges of the thick wires, but it proved unavailing.

1829 Three measures of position taken, good, but as they went on the star became unsteady, and I desisted rather than spoil excellent measures. Distance estimated at 1″.

1830 Very close and difficult. The 4 angles taken differ *inter se* by 10° 50′, [*and the diagram contradicts the mean* 102° 56′ *so very much that it is impossible to allow any value to the series,* when placed in comparison with the other 4 sets.]

1835 *Full moon night, and (as usual) not a trace of cloud in any part of the horizon. A perfect calm. Steady, and well defined.*

1836 This *may* be the star intended by Δ. 183, but I cannot see his two close stars. However, the night is hazy, and definition bad, therefore they may exist.

1839 Not seen triple; but the night is dull, and sometimes the ⁎ B is hardly visible. If this be not Δ. 184, that double ⁎ is not to be found. [It cannot be Δ. 184. See *f* 454.]

1841 Taken for Δ. 186, which it cannot be. Very difficult in dist.

1845 Excessively difficult. A distant star C follows, a good deal to the south.

1846 Too difficult. A star 8 m south, and 5 more, 9 and 10 m north.

1847 Before the distances could be completed a haze came over which put out the small star.

1849 Confused definition.

1851 I suppose this must be Δ. 186, if not, I cannot find it. There is a first class double star preceding this, and somewhat north of it, but that cannot be Δ. 186. [*The D. star alluded to is h.* 4771.]

1852 Very difficult in distance.

1853 Distance by 6 satisfactory oblique transits over a wire 10° inclined.

1854 Difficult in distance, owing to wind.

1856 Glimmering. Very difficult in distance.

1858 Besides the measures obtained with the thick wires, which are always precarious (and which in this case gave 11″.99 for the distance, certainly too great), 3 oblique transits were procured over a wire 5° inclined (too small an inclination), which gave 10.03. The mean of both sets is allowed a value = 2 in the reduced measures.

1861 *γ Lupi.* No doubt remains as to the elongation with the highest power and single eyepiece. Yet the star should be re-examined. Unsteady. Bad position.

1862 A most beautiful double star, but excessively close. However, perfectly sure. A notched disc. More separated than *γ* Virginis now is.

1863 Definition perfect. More separated than *γ* Virginis. [The diagram represents two discs in close contact.]

1865 No confidence in the measures. Elongated, but no firm glimpse to be had.

1866 Being nearly in zenith, and tolerably defined (though restless) the measures are not very bad. Much patience.

1867 Deeply notched—all but separated, perfectly well measurable.

1869 Too low.

1870 Deeply notched. Will not bear No. 4.

1871 Too unsteady. Almost exactly in the parallel.

1872 After sunrise. Disc deeply cleft, not merely notched.

1873 The direction is decidedly oblique to the parallel.

1875 A blank division well and steadily seen with power No. 4, the measures quite to be relied on. The discs are all but points, with a division equal to half or one-third of a disc of each star. Altogether so close that measures of this star when only seen *elongated* must be very precarious.

1877 Certainly double, but very difficult. Best seen with No. 4.

1880 Too difficult. Will not bear illumination enough to see the wire.

1882 Found in looking for Δ. 191, which star it cannot be. [N. B. on this (the south) side of the zenith, the stars are tranquil, and steadiness perfect. On the other, variable refraction is very troublesome. The distance, as measured by 5 oblique transits, and also by the thick wires, differ by no less than 7″.2, whence it is clear that some great mistake must have been made, and both are accordingly rejected.

1884 Distance by 3 oblique transits over a wire 10° inclined.

1885 Too ill defined for good measurement to-night.

1887 Perfectly steady and well defined.

1888 Very difficult (*σ* Normæ). [*Another star having by mistake been taken for σ Normæ, some confusion appears to have arisen, occasioning a suspicion of the zero having sustained some violent change, but on collating the other observations, this is not borne out, and the difference though large, is not more than the excessive inequality of the stars and feebleness of the companion might well give rise to.*]

1889 No distance measurable by the wires. Four oblique transits gave 32″.70.

1895 Mr. Dunlop's polar distance is 10′ ± in error.

1896 Distance a mean of 11″10 given by 8 measures with cross zeros, and 13″.39 by 6 oblique transits over a wire 10° inclined—neither set being good.

1898 Steadiness and definition perfect. Measures excellent, but the use of the thick wires has vitiated the distance.

1899 Perfect steadiness and definition. Distance by cross zeros with the thin wires.

1900 Possibly N P D = 122° 32′, in which case the star is B 5550.

1901 Distance by 5 oblique transits over a wire 10° inclined. Much fatigued by 7 hours uninterrupted work, and, in fact, unable to keep longer awake. [*In consequence I presume the oblique transits, which are delicate, and require especial attention, to be less dependable than usual, they are accordingly allowed only half their value.*]

1902 A set of distances procured with Dollond's concave achromatic eyepiece, but for want of data they cannot be reduced.

1905 Small star, ruddy, and bears good illumination.

1908 ξ Libræ (51 Fl.) will not bear No. 4 (400), but with power 273 it is very well defined and cleanly divided.

1909 Bad measures got by long and patient attention, in a sweeping S. E. blast, allowing but very imperfect and momentary glimpses.

1910 Measured quite easily with the highest power and a perfectly satisfactory set of positions.

1913 Not the least difficulty to-night of getting the finest measure the instrument is capable of.

1919 Too difficult in distance. Requires the thick wires. Cross zeros used.

1920 *Perfect calm. Full moon after rain the day before yesterday, and a cloudy sky all to-day. At present, sky cloudless.*

1922 Rather too faint for good measures, especially in distance. Perfectly steady, and well defined.

1923 June 1, 1846. *New spider lines of Bermuda spiders put into the micrometer for me by Mr. Maclear.*

1924 Steadiness and definition perfect. The small star at the end of the measures had a minute disc quite visible in good illuminations, though at the beginning it was hardly more than a sensible point.

1926 Wants light for No. 3, and is too close for No. 2. Distance very rough.

1927 The spider threads have relapsed into their old habit of hitching in the act of crossing.

1929 Distance by 5 oblique transits. *Full moon. Sky perfectly clear and cloudless. I read small print with ease by its light.* No lamp needed for the measures. Definition good; steadiness perfect.

1930 Extremely close, and will not bear magnifying. Distance too difficult.

1931 Excessively difficult. *Divided*, but almost no interval with No. 2. The discs are points. Wants light for No. 3. Far too difficult for distance.

1934 No measures of position can be more perfectly satisfactory. Double value allowed them.

1935 Distance by 8 oblique transits.

1937 Steadiness perfect; definition very good.

1938 Steadiness and definition perfect.

1929 Perfectly steady and well defined.

1942 Excellent definition. Distance by 5 very good oblique transits.

1943 ρ *Ophiuchi.* [*g of former catalogues, altered to ρ by Mr. Baily in the Catalogue of the British Association.*] Most beautifully defined, and the measures excellent.

1947 A hot north wind suddenly come on has *greatly improved the definition of the stars*, which remain *perfectly steady.*

1948 Perfect measures.

1949 The distance easy (in spite of the faintness of the small star) by reason of its situation, exactly in the meridian.

1950 Perfectly steady, but glimmering, and difficult in distances, for want of light.

1951 Distance between thick wires. Tried oblique transits, but variable refraction proved too troublesome, and defeated the attempt.

1952 In taking the set of distances, found the right hand thread to move by visible jerks. Altered the zero 40 divisions, and worked with the other wire. The jerks were thus obviated, and a dependable set of distances procured with cross zeros.

1953 Well defined and perfectly steady, but bears no illumination, and is excessively difficult in distance.

1954 Distance by five oblique transits over one of the thick wires, while the other was so placed as *just to obscure the large star* at the moment of the small one *emerging* from behind the transit wire (the *emergences* being noted). [*It would appear that this method, as might indeed be expected, gives results in excess.*]

1955 Three oblique transits taken, but too difficult; the moon being too bright. *Moon nearly full, and a lunar rainbow seen on the dewed herbage.*

1956 Five oblique transits. A third star much closer violently suspected, nearly south.

1957 Three not very satisfactory oblique transits.

1958 Found in looking for Δ. 205 (which it cannot be). There is no double star in Mr. Dunlop's place.

1959 No star near answering the description of Δ. 205. Steady and well defined.

1961 Hot north wind with occasional cold blasts—and the definition of the star alternately good and bad, but not unsteady.

1962 The chief star of a cluster.

1963 Found in looking for Δ. 208, which does not exist, unless this be it; but the descriptions disagree, and it cannot be the same. Distance by three oblique transits. Very difficult.

1965 Too faint and difficult for a good determination of distance.

1966 Very coarse. Sixth class. Stars perfectly steady under the healing influence of a hot north wind which has just set in.

1968 The measures taken with the lowest power No. 1 (= 79). [N.B. *This is too low for measurements of distance by the thick wires without cross zeros, and accounts for the enormous excess in the reduced distance. The observations must be rejected.*]

1969 Clouded before the measures of distance could be finished, and those obtained too imperfectly seen to have any value.

1970 Surely this star must have changed in distance.

1971 Stars superbly defined and steady, rendering the measures easy, in spite of the great difference of magnitudes.

1972 Imperfect measure, owing to flitting cloud and indistinctness.

1975 Distance by five very good oblique transits.

1976 Too difficult for measures of distance.

1977 Distance too difficult for this instrument.

1978 A new set of spider lines adapted to the micrometer by Mr. Maclear which do *not* hitch. [*The first set applied by him, June 3, did not prove quite satisfactory.*]

1979 A very symmetrical little constellation of two large and three very minute stars, 12 m, forming a pentagon somewhat elongated in a direction perpendicular to the two large stars at its base.

1980 Two sets of distances obtained, one with the thick wires and without cross zeros, and therefore precarious (17″.66); and one by 5 oblique transits (15″.72) much more to be relied on.

1983 Though I have scarcely a doubt about the existence of the companion, it is far too difficult to get measures with this instrument. [N.B. *This observation was never verified, and from subsequent consideration of several similar cases there is reason to believe the small star to have been an illusion, for which reason I have not entered it in the general catalogue.*

1985 As perfectly defined and as good measures as it is possible to get. This star has changed.

1987 I do not suppose finer measures can be had. The stars *heave* together by refraction without relative motion.

1988 Not far from the moon, and an occultation expected. The threads *hitch* abominably. Zero changed one revolution, but still has same fault. [*In consequence only one half the registered weight allowed to the distance.*]

1989 The preceding of two double stars in the field together.

1990 Very difficult, yet all circumstances perfectly favourable.

1991 The following of two double stars; all circumstances perfect.

1992 All circumstances perfect.

1993 Very difficult in distance with the thin wires.

1994 Object glass much dewed *internally*. Very difficult in dist.

1995 A very coarse double star, of which the place agrees with Δ. 216, but the other particulars differ completely. The large star is a close double star, hitherto undescribed.

2001 Distance of A C by 5 differences of R A, mean = $7^s.37$. Mr. Dunlop makes the diff. of R A in his star No. 216 to be $1^s.55$. [*Yet the places agree, and there is no other near.*]

2003 Bears strong illumination.

2004 One of the most difficult double stars [*for this instrument*] in the heavens. Certain of its being double. The definition is perfectly beautiful. No rings *or appendages whatever*—a mere lambent quiet disc, with a point beside it.

2005 Seen double with No. 2; better with No. 3; best with No. 4. Well separated, and quite sure. No doubt whatever. Extremely *difficult*.

2007 Very difficult. [N.B. The thick wires are admirable for these difficult, *distant* stars. The distance was obtained with more ease than the position.

2008 Distance by 6 differences of R A.

2009 Very difficult in distance. Thin wires and cross zeros.

2011 Distance by 5 differences of R A.

2014 } 2015 } The R A and P D of this star as read off and set down in this obs are $16^h 48^m 39^s$ and 120° 31′. But the star has been repeatedly looked for since in that place, without success. A mistake of 20′ in declination (easily committed) and 1^h in R A brings it to coincidence with No. 450 of Johnson's Catal., in a review of which Catal. the latter was seen double, and measured June 18, 1837 (No. 2015.) On a collation of all the observations, the identity of both with h. 5003 can admit of no doubt.

2016 Every circumstance eminently favourable.

2017 Do. Dist by thin wires and cross zeros, but the illumination is not sufficient to give perfect measures of distance.

2019 Discovered in a review of large stars. Distance certainly below 1″, but seen double with 279.

2020 Fairly elongated, but not divided with 279. No dependence on the measures,—the night becoming bad.

2021 Elongated with No. 3, but hardly measurable. With No. 4, a black division like a train is seen in momentary glimpses.

2022 Excessively close and difficult.

2023 A superb observing night after three days' rain. Every condition of observing perfect.

2024 Excellent definition, but tremulous.

2025 Distance by 10 oblique transits.

2026 Well defined, but refraction variable.

2127 Distance by 11 oblique transits.

2028 Ill defined. Before the distances were taken it suddenly grew so furred that I could no longer distinguish the two stars.

2031 All conditions perfect.

2032 Very difficult in distance.

2034 Vicinæ, difficillima. Discovered with No. 3, but only a violent suspicion, which No. 4 positively verified, showing the small star well separated, but it requires a capital night. The larger and most southern of two.

2035 Bears some illumination. Small threads used for distance; large ones for position.

2037 No. 2 not powerful enough. No. 3 wants light. Not well defined.

2038 Pos between the thick wires. Three measures of pos procured by the horizontal wire alone gave a mean 303° 57′, but this I reject, as the stars are too minute to be brought into comparison with a single spider line.

2039 Ill defined; a south-easter having most unexpectedly and suddenly come on (after a very short lull) upon the shoulders of a warm north wind, contradicting all expectations.

2040 Distance by 4 oblique transits.

2042 All conditions favourable.

2043 Dunlop's R A is 18 4 46. There is no other double star preceding in R A. Well examined.

2045 Examined the revolutions of the screw in distance, as Mr. Dunlop makes the distance 40″. Found all right.

2046 Used the thin wires and an adjusted zero without crossing.

2047 Good definition and perfect steadiness. Nine distances taken.

2048 Over the Table Mountain. Blotted and dim, so as sometimes hardly to be seen.

2049 Dull cirro-cumular streaks on star. No getting a distance.

2050 Distance particularly good, owing to the very favourable angle of position.

2052 Distance by two excellent series, viz., 21″.22 by cross zeros by motion of a single wire in declination—(the small star being *nearly* in meridian) *the single thread being set to zero*—and 21.76 by the usual method of cross zeros.

2054 All conditions perfect, yet difficult in distance.

4 A

2055 Distance by 3 oblique transits.

2056 The wires hitching in the measures of distance (mean = 82″.33) a set of differences of R A, three in number, whose mean are 83″.00. The mean of both sets adopted.

2057 Δ. 224. N. B. Looked well for Δ. 223, all round 2 fields + and − in R A and declination. No such stars to be found. [Dist 83.56 by Δ. R A 79″.54 was obtained by 3 measures with the thick wires. The star being very coarse, it is probable that the measures were somewhat roughly taken, and their mean is accordingly unscrupulously adopted.]

2059 Extremely close and difficult. In a worse night measures would be impracticable. At present every condition is perfect.

2060 Very close; 273 is hardly power enough, but the night will not bear power. Tried No. 4. Worse defined, but better separated, and measures better.

2062 Detected in a review of ASC. The hitching of the threads very bad in distance. Obliged in consequence to reject the result.

2063 Unsteady, and at length growing ill defined.

2064 Position excellent, but grew very ill defined before distances could be got.

2066 Threads move by jerks.

2067 Very doubtful measures; stars convulsed, and discs dancing in flare.

2069 The northern star of γ Coronæ Aus, is a mere trifle the smaller of the two.

2075 Most dreadfully ill defined, a violent struggle going forward between the regular S. E. wind and a hot north-wester which is coming on.

2076 Very ill defined and tremulous. The first fine night after several days' rain. Calm and clear. Therm. 47° Fahr.

2077 Excessively difficult, yet I feel convinced it *is* double. [N. B. After all, there remains some degree of suspicion attached to this star, the quadrant being s f in which an illusory appendage has been frequently observed.]

2078 No appendage observed to the distant star C, 7 m. Distance by a single difference of R A, pos by a single measure.

2079 Glimmering; will not bear high powers; No. 2 answers best.

2081 *Full moon at* 10 P. M. *Calm, serene, and perfectly cloudless.* The distance is assuredly greater than 4″. I should estimate it at 6″.

2083 Too close and faint for the power used, No. 2, but will not bear No. 3.

2085 Large star, pale yellow; small one, pale blue.

2086 Dist by 5 differences of R A. Yellow and pale blue.

2087 Distance by 7 oblique transits as a trial of the method [*since* so often used]. The calculation is troublesome, but the method seems to be beautifully exact, provided the zero of the micrometer be well secured. Result = 22″.63 (4). Ditto by 3 measures between the thick wires 24.15 (1). — mean 22.93 (5).

2088 No dependence on the distance, as the threads drag—an evil which *must* be cured. All other conditions perfect.

2090 The fine threads being now quite deranged, the system of measurement by interior bisections and contacts of the coarse ones was commenced (July 20, 1834). The place agrees nearly with that of R. 25, but it is not the same double star.

2092 At first well defined, but grew faint and so confused that dew was suspected on the object glass—and so it proved.

2094 Distance by 10 oblique transits 10″.35. By 5 direct measures between the thick wires (duly corrected) 10″.33.

2096 Mr. Dunlop's place is a degree erroneous in P D.

2099 Distance by a mean of 5 oblique transits over a wire 4° 55′ inclined, carefully observed — 4″.37; by two measures between thin wires duly corrected 4″.44.

2101 Distance by 6 oblique transits over a wire 5° 9′ inclined = 21″.24. By 2 measures with thick wires 21″.58.

2102 Distance by 10 oblique transits over a wire 10° inclined = 22″.43. By 5 measures with thick wires 23″.80.

2103 All conditions excellent.

2104 Dist by 7 oblique transits at 10° inclin. = 6″.07; by a single measure with thick wires 6″.08.

2105 Measured with the "*macro-micrometer.*"

2107 Distances taken with half the object glass intercepted by the roof.

2109 While taking the distances, detected again the spider-lines hitching in the act of crossing. In consequence took 10 measures, crossing each time to *observe* and *destroy* the effect. On the whole they were found to return by their elasticity very nearly to the same places, so that the effect on the distance is not formidable. Mean 8″.04 (2). Dist by 4 oblique transits at 10° = 7″.72 (2).

2112 Dist by 4 measures with thick wires = 58″.86 (1) by 10 oblique transits 60″.51 (3) the stars not lying favourably.

2114 The threads still hitch, and as they now affect the zero when they cross, no reliance can be placed on the distance.

2115 *θ Indi.* Detected in the course of review. [N. B. This ✻ is not in AS. Cat. though No. 2533, which is not 5 m, but 7.8, is very near it, and in the field of the finder.]

2116 Growing unsteady, and *reeling.* No distance could be got.

2117 Difficult; but the small star *certainly seen* and measured. In a perfectly good night this would be a very elegant object.

2118 Bears illuminating. Sometimes finely seen.

2119 Excessively difficult; a 20-feet object. Only a single rude measure of distance, of no sort of value.

2120 Distance by 5 differences of R A.

2121 Extremely difficult. The small star not to be seen with 179, and barely with 273. Measured with 400, which shows it *certainly*, but no measure of distance could be got.

2123 Detected in a review (λ *Octantis*). Bears strong illumination. Unsteady, twirling.

2124 No doubt about the star being double, but it is difficult and delicate, and the low situation makes it hard to see and measure, but it bears a good illumination. Twitching. Tolerably defined.

2125 A difficult star, from the low situation and atmospheric affections. To-night well seen, though a good deal plagued with appendages.

2126 A third star C 11 m near.—[? if P D be not rather 107° 5′.]

2127 Distance by 4 measures with thick wires 52.21 (1); by 6 differences of R A 49.83 (1).

2129 All circumstances favourable. Distance by 5 good measures with thick wires 29″.77 (2); by 5 ditto oblique transits at 10° inclination = 30″.67 (3).

2130 Very difficult.

2132 Will bear no illumination. One rough reading of distance only got.

2133 Extremely difficult. A 3rd 9 m or 8.9 about 2′ distant. 105 shows it nicely double.

2134 Extremely difficult. An object for 20-feet. Wanting light. Ill defined.

2135 Too difficult. A 20-feet object. Only seen double by momentary ghost-like glimpses. Only a single reading [*it cannot be called a measure*] of position obtained [*of no value*].

2139 Close and difficult. Distance excessively so.

2140 Twirling and ill defined.

2142 Measures perfectly satisfactory.

2143 A good star for No. 1. (Power 105), and easily measured. All good.

2144 Oblique transits attempted, but spoiled by variable refraction.

2145 May be pretty well measured with patience, but requires a perfect night, considerable power (as 273) and light in field.

2146 Stars ill defined and unsteady, generally, but with *perfect* intervals. Waiting patiently for these the measures are not difficult.

2148 Distance by 3 measures with thick wires 60.63(1); by 3 oblique transits at 10°, 61″.49(2).

2149 A rare opportunity and perfectly taken advantage of.

2150 The wires hitch in crossing, [*but return to their places by elasticity, as is evident on comparing the + and − readings.*]

2151 Distance by 6 measures between thick wires 4.88(1), by 16 oblique transits at inclination 5°, 4.01(4).

2153 Distance by 3 thick wire measures 30.23(1); by 4 oblique transits over the *thick* wire 27.29(2).

2154 Most wonderful definition and perfect steadiness.

2156, 2157, 2158 Some great confusion about the measures in distance of A B. 2156 by 2 oblique transits gave 85″.31. No. 2157 by a single Δ R A 3s.0 = 116.69, but it is remarked that the definition was very bad; while again, No. 2158 by 6 differences of R A (2s.65) gave 98″.28. The great angle of position (83° with the parallel), however, renders the method of differences of R A liable to *enormous* errors, while it favours the oblique transits. Both the former are therefore rejected. Yet I cannot help suspecting some mistake in setting the wire for the latter, and in consequence attribute no value to the result.

2162 All conditions perfectly good.

2163 Detected in a review. *Tangibly* certain, but would be impossible to measure under less favourable circumstances of sky, steadiness, and definition. Bears strong illumination. The small star is quite beyond the rings.

2164 The smallest point imaginable.

2165 The description of Δ. 244 might suit this star, but there are 18′ of difference in declination.

2167 Measured with Dollond's macro-micrometer eyepiece. Threads hitch in crossing. The measures of distance not reducible for want of data.

2168 Irregular motion of the thin threads in measures of distance avoided by a peculiar management of the micrometer.

2169 All conditions of good observing perfectly satisfied.

2171 Distance 5 by thick wire measures = 15″.50(1), by 7 oblique transits at 10° = 14.74(3).

2176 γ Tucanæ precedes 69s.5; position of the double star from γ = 111° 15′. A star 10 m nearly in the line B A prolonged.

2179 Distance by 4 thick wire measures 16″.81(1); by 5 oblique transits at 10°, 16″.56(2).

2181 All conditions of observation perfect.

2182 A violent suspicion that the large star is close double. In good glimpses I can hardly doubt it. [*The companion, if it exist, is* 8′ m, *and almost exactly following by diagram.*]

2183 Exactly in the parallel, so as to allow no motion of the wire without destroying the measure. Most carefully examined in every way.

2184 All conditions satisfied.

2185 Measures of distance by the thick wires but with cross zeros. It will not bear illumination enough for the spider thread.

2186 *Moon approaching the full.* A very fine calm clear night.

2188 Distances good for little as the wires jerk.

2191 All conditions perfect.

2193 Moonlight too strong for the measures.

2194 Extremely difficult except in so fine a night as this.

SYNOPSIS OF THE RESULTS OF THE MICROMETRICAL MEASURES OF DOUBLE STARS.

No.	Name of Star.	R A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
1	h. 1944	0 5	108 6	7′ 8	345.8	6.56	10	67.59	6.64	8
2	β Toucani	0 24	153 54	5 = 5	172.2	5.71	13	27.72	5.79	15
3	ξ Apparatus	0 25	125 55	6′ 9	164.2	5.22	8	6.45	5.45	4
4	h. 3376	0 26	146 16	6′ 11	247.6	7.27	5	7.60	7.35	4
5	h. 3395	0 38	132 50	8′ 9	63.0	6.01	6	8.95	7.20	4
6	λ Toucani	0 46	160 26	7 8	79.2	6.78	13	21.25	6.83	14
7	σ. 17	0 50	106 34	7′ = 7′	32.0	5.81	9	6.65	6.99	5
8	h. 3416	0 56	151 0	8 = 8	126.8	6.15	9	5.33	6.40	9
9	ζ Phœnicis	1 1	146 9	5′ 10	244.0	5.89	5	6.27	5.71	2
10	Σ. 110	1 9	103 12	8′ 9	352.7	7.80	2	8.05	7.80	2
11	κ Toucani	1 10	159 47	6 10	16.4	6.75	5	4.75	6.82	3
12	h. 3426	1 11	157 18	6′ 10	347.5	7.02	3	2.52	7.74	1
13	h. 2036	1 12	106 41	8′ 9	40.4	6.54	3	1.82	6.96	2
14	h. 3437	1 20	108 9	7 9	245.2	6.35	4	13.00	6.64	4
15	h. 3447	1 28	120 47	6 7	75.5	7.11	5	3.12	7.51	4
16	Δ. 4	1 32	144 18	7′ 8	104.6	6.28	6	10.46	6.28	2
17	p Eridani	1 33	147 3	6′ = 6′	122.3	5.00	10	3.65	5.00	10
18	Σ. 147	1 33	102 7	6 8	86.9	7.80	3	4.65	7.80	2
19	h. 3461	1 38	115 54	6 10	69.6	6.54	5	5.53	6.70	4
20	h. 3469	1 42	129 12	6 10	70.9	7.81	1	2.25	7.81	0
21	h. 3475	1 50	151 8	7 7	37.6	7.38	6	3.35	7.24	6
22	h. 3484	2 2	120 27	8 9′	63.5	7.01	2	89.16	7.01	1
23	h. 3488	2 7	152 27	9 9′	134.8	5.84	4	5.83	6.20	3
24	h. 3504	2 23	121 7	8 9	268.5	6.91	4	7.47	7.09	5
25	h. 3506	2 26	118 59	5′ 8	241.7	6.34	8	11.15	6.34	8
26	h. 3510	2 28	133 44	9′ 10	9.7	6.75	3	4.33	6.64	0
27	B. 379	2 32	135 27	7′ = 7′	7.6	6.84	3	97.26	6.84	3
28	h. 3523	2 35	120 17	8 8	94.7	7.01	2	62.74	7.01	4
29	h. 3526	2 36	121 48	7 11	56.6	4.78	1	15.—	4.78	0
30	h. 3527	2 37	131 15	7′ = 7′	43.2	6.65	7	1.47	6.81	7
31	B. 394	2 37	116 15	6′ 9	185.1	6.29	4	11.16	6.59	5
32	Δ. 8	2 51	115 40	7 7′	221.4	5.90	3	28.62	5.90	2
33	θ Eridani	2 52	130 59	5 6	81.5	5.80	10	8.68	5.73	6
34	Δ. 10	2 58	141 59	7 8	70.7	7.94	2	37.31	7.94	2
35	12 Eridani	3 5	119 40	3′ 8	310.0	6.23	6	5.30	6.40	4
36	h. 3562	3 9	154 57	8′ 9	328.8	6.90	3	48.38	6.90	2
37	h. 3565	3 11	109 6	5 9	110.4	5.81	4	5.77	5.76	1
38	Δ. 12	3 12	155 4	7 9′	102.3	6.41	6	19.70	6.57	3
39	h. 3576	3 19	136 14	7 9	339.6	6.66	6	4.00	6.85	8
40	h. 3575	3 20	141 40	7 10′	42.1	5.34	6	31.55	5.91	1
41	Δ. 15	3 34	130 55	7 8	326.6	6.02	10	8.81	5.75	6
42	Δ. 14	3 35	150 20	7′ 8	269.9	6.01	5	59.28	6.84	1
43	h. 3589	3 38	131 12	7 11	344.8	7.07	2	6.58	7.07	2
44	h. 3592	3 40	144 48	6 10	11.3	6.99	6	5.98	6.99	4
45	f Eridani	3 42	128 9	5 5′	199.7	6.48	7	8.55	6.57	6
46	h. 3596	3 42	122 18	8 = 8	136.3	6.54	5	10.15	6.72	5
47	h. 3622	3 59	126 18	8′ 9	112.8	7.92	3	10.34	7.92	3
48	h. 3627	4 6	124 12	8 10	303.7	7.92	3	29.79	7.92	3
49	h. 3628	4 6	126 36	7 7	50.0	8.08	2	50.51	8.08	2
50	h. 3632	4 8	120 30	8 10	161.9	6.45	4	11.00	6.63	3
51	h. 3634	4 10	135 3	9 9	148.3	6.36	5	12.87	6.56	3
52	h. 3641	4 13	152 37	5′ 12	289.6	6.96	1	6.90	6.96	1
53	h. 3642	4 13	124 17	7 10	157.6	7.89	4	5.78	7.90	5
54	θ Reticuli	4 16	153 40	5′ 9	6.1	5.60	5	6.40	6.15	3
55	R. 4 = B. 713	4 21	147 28	7′ 8	231.8	6.93	6	7.10	6.93	6
56	h. 3650	4 21	130 55	7 9′	184.1	6.91	4	4.95	6.91	4
57	h. 3664	4 28	115 23	7 11	189.7	7.95	2	22.42	7.95	1
58	α Doradûs	4 30	145 24	3 11	108.5	6.01	2	82.29	6.01	1
59	h. 3677	4 34	119 54	9 = 9	170.9	6.42	4	11.75	6.59	3
60	h. 3678	4 34	135 22	8 10	327.2	6.48	4	42.04	6.64	3
61	h. 3683	4 38	149 17	8 = 8	81.2	6.40	6	3.82	6.50	5
62	h. 3694	4 44	135 27	8 10	62.0	6.63	3	5.79	6.01	1
63	h. 3702	4 47	115 26	9 10	221.0	6.96	4	20.99	6.96	4
64	ι. Pictoris	4 47	143 45	5′ 6′	57.9	4.97	6	12.38	4.98	7
65	h. 3735	5 7	122 7	8 = 8	150.8	6.40	5	7.59	6.61	3

No.	Name of Star.	R A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
66	Rigel	5 7	98 24	1 8	199.8	6.42	10	9.42	6.63	10
67	h. 3741	5 9	168 32	6 10	113.5	5.98	4	42.71	5.98	2
68	h. 3745	5 12	124 12	7′ 10	166.2	8.01	3	11.42	8.04	1
69	σ. 170	5 12	108 42	7 7′	18.0	7.50	6	39.03	7.56	7
70	h. 3751	5 14	123 34	9 10	319.7	7.09	5	23.09	7.09	4
71	h. 3752	5 15	114 57	6 9′	110.3	7.44	5	3.33	7.35	7
—	Do. A C.	....	......	6 9	106.1	7.33	6	58.81	7.27	4
72	h. 3759	5 19	109 50	6 9	315.2	7.95	7	28.70	7.95	7
73	h. 3760	5 20	125 30	7 7′	221.3	5.68	4	7.32	5.46	2
74	θ Pictoris	5 21	142 28	6′ 6′	285.9	6.40	6	38.20	6.64	4
75	h. 3767	5 25	137 13	6 11	226.5	6.58	3	20.—	6.92	0
76	Δ. 21	5 25	137 13	6 7	264.1	7.92	1	197.15	6.92	1
77	Δ. 22	5 26	132 26	7 8	171.8	4.97	6	8.46	4.98	5
78	h. 3777	5 30	145 1	6′ 9′	349.3	4.95	1	51.82	4.95	1
79	ζ Orionis	5 32	92 3	2 6	147.9	6.96	3	2.76	6.96	4
80	h. 3797	5 40	136 22	8 9	175.4	6.01	4	50.50	6.01	2
81	h. 3803	5 42	134 55	7′ 10	114.0	6.56	5	19.98	6.93	2
82	h. 3823	5 54	121 4	9 = 9	130.5	6.86	10	4.84	6.95	9
83	Δ. 23	6 0	138 26	8 = 8	163.0	6.13	5	3.86	5.02	2
84	B. 1201	6 12	155 29	7′ 8′	114.9	6.16	7	21.52	6.25	7
85	B. 1210	6 14	149 8	6 7′	224.1	6.50	6	55.15	6.70	5
86	h. 3849	6 14	129 25	6′ 7	52.3	7.79	4	39.43	7.79	4
87	h. 3857	6 18	126 38	5′ 7	66.2	8.00	5	69.54	8.00	5
88	B. 1254	6 24	130 16	6′ 6′	110.2	8.09	2	71.00	8.09	2
89	Δ. 30	6 26	140 7	6 8′	317.8	5.94	5	13.63	5.27	3
90	Δ. 31	6 34	138 4	5′ 7′	317.0	5.92	8	13.40	6.31	7
91	h. 5443	6 36	130 11	9′ 10	104.7	5.99	5	17.25	6.01	2
92	Δ. 32	6 36	128 14	6′ 8	276.1	5.41	5	8.43	5.35	3
93	h. 3889	6 39	140 17	6′ 8′	266.1	6.50	6	42.46	6.78	4
94	h. 3891	6 39	120 47	6 10	222.0	8.00	5	5.02	7.97	5
95	Δ. 38	6 59	133 23	6 7′	121.0	5.96	6	20.39	5.96	2
96	h. 3928	6 59	124 31	6′ 8′	157.7	6.60	7	5.39	6.84	5
	——— A C.				286.5	6.70	6	37.04	6.80	4
97	Δ. 39	7 1	148 56	6′ 7′	74.9	6.19	8	2.40	6.26	5
98	h. 3931	7 1	132 4	6′ 7′	40.8	5.99	5	72.92	6.00	2
99	Δ. 40	7 6	146 5	6′ 7′	140.2	8.10	4	38.12	8.10	5
100	Δ. 41	7 7	145 18	7′ 7′	224.8	5.41	5	7.67	5.35	3
101	h. 3941	7 7	150 6	9 9	310.4	7.09	2	0.81	6.75	0
102	h. 3945	7 9	113 12	6′ 7′	67.6	7.21	5	28.21	7.22	6
103	B. 1523	7 9	120 36	6′ 8	181.3	8.20	6	37.50	7.10	5
104	γ Volantis	7 10	160 13	5 7	301.3	6.40	13	12.81	6.34	12
105	h. 3949	7 12	120 30	8 8	74.6	7.05	9	3.20	7.38	9
106	h. 3958	7 16	141 53	7′ 9	281.9	6.26	8	32.18	6.73	6
107	R. 6	7 16	142 0	6′ 7	16.1	4.99	5	10.48	4.98	4
108	h. 3960	7 16	138 12	9 10	163.9	6.28	8	8.77	6.64	5
109	B. 1582	7 17	138 13	7 8	157.6	6.36	9	22.71	6.54	8
110	h. 3966	7 19	126 57	7 = 7	140.9	5.97	5	7.03	5.96	2
111	B. 1603	7 20	151 38	6′ 8	209.9	6.99	2	179.00	6.99	1
112	Δ. 49	7 22	121 30	6′ 7′	51.8	6.84	15	9.63	6.99	16
113	σ Argus	7 24	132 58	5 10	75.0	6.01	6	22.52	6.00	2
114	Δ. 52	7 27	113 7	6′ 6′	106.8	6.69	10	9.37	6.91	9
115	h. 3984	7 29	144 48	7 8	258.0	7.27	5	64.53	7.82	8
116	h. 3988	7 31	138 28	8 10	299.6	6.52	4	16.61	6.77	4
117	Δ. 53	7 32	116 24	5 = 5	137.8	6.67	9	10.26	6.40	10
118	h. 3994	7 35	138 40	7 10′	17.1	6.25	6	13.11	6.81	4
—	Do. A C.	....	......	7 11	216.9	5.88	5	19.51	6.39	3
119	h. 3997	7 39	163 53	8 = 8	100.8	6.56	4	1.75	6.83	5
120	Δ. 55	7 40	140 2	7 8	132.9	7.53	4	50.94	7.53	6
121	h. 4005	7 41	146 18	6 11	220.0	6.55	2	37.98	6.55	2
122	B. 1753	7 41	131 4	7 7′	176.8	6.82	5	49.13	6.51	4
123	h. 4018	7 49	149 11	7′ 11	323.1	7.74	3	6.06	8.08	1
—	Do. A C	....	......	7′ 11	258.7	8.08	1	60.38	8.08	1
124	h. 4024	7 53	119 3	8 9′	81.1	7.04	5	10.65	7.04	5
125	h. 4027	7 54	150 21	8′ 9	115.2	5.91	5	9.41	6.11	6
126	h. 4028	7 54	139 31	7 = 7	46.9	6.61	6	17.05	6.88	5
127	h. 4031	7 56	150 24	8 9	359.7	5.91	5	6.34	6.31	5
128	h. 4032	7 56	136 50	7 9′	351.4	6.55	4	30.41	7.06	3
129	h. 4038	7 57	130 50	7 8′	345.4	7.04	4	29.10	7.04	6
130	Δ. 60	7 57	144 3	7 9	160.4	7.00	4	40.42	7.54	4
131	h. 4046	7 59	123 5	6 8′	88.5	8.00	4	22.29	8.00	4
132	Δ. 62	8 2	152 21	6 7	264.5	6.71	4	87.90	6.71	4
133	Δ. 63	8 4	132 8	7 8′	80.5	6.02	7	5.95	6.04	2

No.	Name of Star.	R A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
134	γ Argus	8 4	136 50	2 6	220.2	5.11	6	41.16	5.09	7
—	A C	....	......	2 8	151.6	5.14	5	62.40	5.18	2
—	B C	....	......	6 8	111.8	5.02	2	....	..	..
135	h. 4055....................	8 6	159 23	8′ 8′	9.5	7.08	6	6.76	7.08	6
136	h. 4057....................	8 7	132 29	6 9′	297.8	6.93	5	23.75	7.44	3
137	h. 4060....................	8 7	125 56	9 10	177.0	6.99	1	21.59	6.99	2
138	ε Volantis	8 7	158 7	5′ 10	23.2	5.01	6	6.69	5.01	3
139	Δ. 67	8 8	125 49	6 7	175.2	7.54	4	67.45	7.85	5
140	h. 4069....................	8 9	135 19	6′ 9	256.7	6.49	6	33.24	6.84	5
141	B. 1974	8 13	134 30	8′ 8′	146.6	6.22	6	5.15	6.05	5
142	h. 4087....................	8 16	130 27	8 8	146.8	7.39	4	0.83	7.62	0
143	B. 2018	8 20	160 58	6 6′	55.0	5.92	2	64.97	5.92	1
—	B C	....	......	6′ 7	28.7	5.92	2	34.16	5.92	1
144	Δ. 70	8 24	134 10	6 9	350.3	5.49	8	5.58	6.73	4
145	h. 4104....................	8 24	137 21	6 9	242.3	6.51	9	4.40	6.51	3
—	A C	....	......	6 10	39.9	5.81	5	20.06	5.72	2
146	h. 4126....................	8 35	142 29	6 10	31.3	5.96	8	16.22	6.28	4
147	h. 4128....................	8 36	149 43	7′ 8	221.9	6.66	3	2.51	6.66	3
148	h. 4130....................	8 37	146 57	7 10′	226.1	6.68	2	3.50	6.68	0
149	B. 2168 *	8 38	142 30	6 6′	309.8	6.62	6	{ 77.20 { 64.79	6.17 7.07	3 3
150	h. 4133....................	8 38	132 2	5 11	60.8	5.12	3	47.20	5.12	1
151	R. 9	8 41	148 6	8 8	110.1	6.77	13	4.87	7.03	11
—	½ (A + B), C	....	......	8 11	354.2	5.91	1	....	..	..
—	½ (A + B), D	....	......	8 10	217.1	5.91	1	....	..	..
152	S. 585	8 47	107 36	5′ 7	145.5	7.21	3	68.95	7.21	3
153	B. 2286	8 51	144 53	7 7	356.5	6.53	9	66.46	6.93	7
154	Δ. 74	8 53	148 34	6 7	75.0	6.30	11	40.59	6.98	8
155	h. 4165....................	8 56	141 31	6 8	88.2	7.25	4	1.41	7.23	2
156	h. 4172....................	8 59	114 43	9 10	216.6	7.21	5	7.51	7.19	4
157	h. 4188....................	9 6	132 55	6′ 7′	286.9	5.71	6	3.07	5.84	3
158	R. 10	9 16	159 5	8 8	18.3	8.10	5	11.44	8.10	5
159	ζ Octantis	9 20	174 58	5′ 9′	113.2	5.08	2	1.71	5.13	1
160	Δ. 76	9 22	134 45	6′ 7	97.8	8.09	3	59.57	8.09	3
161	Δ. 77	9 23	133 48	8 8	257.8	7.10	2	108.47	7.10	3
162	ζ Antliæ	9 23	121 10	6 7	210.6	6.32	11	8.38	6.12	10
163	h. 4220....................	9 28	138 15	6′ 7′	202.0	6.13	8	2.99	6.45	5
164	B. 2546	9 28	138 59	7 7	30.9	5.88	8	130.70	5.95	5
165	Δ. 80	9 39	138 43	8 = 8	68.5	6.09	9	18.27	6.09	3
166	h. 4249....................	9 42	124 14	8 8	125.2	6.31	8	4.93	6.60	5
167	υ Argus	9 43	154 17	3 8	126.1	6.83	8	4.90	6.92	7
168	h. 4252....................	9 43	154 18	9′ = 9′	301.7	6.71	5	12.98	6.77	3
169	Δ. 81	9 48	134 29	6 10	239.1	6.15	8	5.95	6.15	3
170	h. 4272....................	9 51	175 13	7 7	267.2	7.30	12	16.26	7.23	8
171	Δ. 83	9 56	144 10	7 7′	222.6	7.17	4	109.50	7.24	4
172	h. 4282....................	9 57	141 15	7 8	205.0	6.64	5	70.43	6.86	5
173	h. 4283....................	9 58	140 58	8 9	181.0	6.17	5	7.26	6.16	3
174	h. 4289....................	10 3	153 46	10′ 10′	60.5	7.24	5	11.80	7.26	2
175	h. 4306....................	10 13	153 49	7 = 7	139.3	6.66	6	1.34	6.91	4
176	R. 13	10 15	145 11	5 10	103.5	6.95	6	7.04	6.47	5
—	— A C..................	......	......	5 10	191.4	5.91	4	36.71	6.18	2
177	h. 4323....................	10 23	151 43	8 8′	219.6	7.16	6	22.29	7.15	7
178	Δ. 86	10 24	131 21	7 8	291.8	8.09	3	82.71	8.09	2
179	h. 4327....................	10 24	143 38	8 8	352.2	7.10	2	113.73	7.10	1
180	Δ. 87	10 25	150 29	7 7′	331.2	5.98	3	83.52	6.71	3
181	Δ. 88	10 25	134 12	6′ 6′	37.8	6.61	11	13.85	6.50	5
182	h. 4329....................	10 25	142 51	5′ 9	17.4	7.12	6	17.53	7.12	6
183	h. 4330....................	10 26	136 8	6 9	164.4	6.61	6	40.66	6.95	4
184	h. 4332....................	10 26	136 6	7′ 10	164.8	6.61	6	26.38	6.61	2
185	Δ. 89	10 26	144 30	7 7′	30.7	7.16	8	26.41	7.17	7
186	Δ. 91	10 28	161 14	8′ 9	59.1	6.74	8	10.04	6.67	6
187	Δ. 93	10 29	153 15	8 9	37.7	6.49	5	26.39	6.62	3
188	Δ. 94	10 32	148 18	6 10	21.4	6.66	6	15.25	6.76	5
189	Δ. 95	10 33	144 43	6 8	105.1	8.09	3	51.85	8.09	2
190	h. 4346....................	10 35	150 8	8 10	81.1	7.46	3	26.46	7.28	2
191	B. 3181	10 37	150 17	7 9′	173.5	7.18	11	13.02	7.19	9
192	h. 4356....................	10 37	148 39	3 10	147.9	6.32	3	3.00	6.32.	1
193	h. 4359....................	10 37	149 12	8 11	234.8	7.3..	2	1.50	7.3..	0
194	B. 3194	10 38	148 51	8′ 9	214.5	6.69	6	18.27	6.96	4
195	h. 4360....................	10 38	148 41	9 9	117.2	5.72	4	2.24	6.25	2
—	C, ½ (A + B) } = B. 3190 }	......	......	8 8	108.7	6.35	9	13.80	7.88	5

No.	Name of Star.	R. A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
196	h. 4364	10 38	148 28	8 10	352.3	6.77	4	6.69	7.22	3
197	Δ. 99	10 39	159 58	7 7	75.4	7.14	3	63.92	7.14	1
		......	......	7 9	40.2	7.14	2	....	..	..
		......	......	7 9	285.6	7.14	2	....	..	..
198	h. 4374	10 42	148 33	8 10′	115.2	6.31	1	10.14	6.31	0
199	h. 4378	10 45	149 3	7′ 10	344.4	6.16	3	30.89	6.16	1
200	Δ. 102, A B	10 47	147 57	4 8	13.0	7.14	1	65.28	7.14	1
—	Δ. 103, A C	......	......	4 7	200.2	7.14	1	163±	7.14	0
201	h. 4383	10 48	159 50	7 8′	285.8	7.18	1	1.42	7.18	0
202	h. 4393	10 51	158 8	7′ 10	131.0	5.31	3	7.10	5.31	1
203	h. 4409	10 59	131 43	5′ 9	278.0	7.30	4	1.40	7.25	3
204	h. 4423	11 9	134 57	7 7′	269.2	6.41	5	1.28	5.95	5
205	h. 4432	11 17	154 2	6 8	288.5	6.03	5	2.37	6.51	3
206	B. 3574	11 17	150 43	8 9	296.7	8.10	5	6.38	8.10	6
207	B. 3594	11 20	131 44	6 8	166.9	5.27	7	12.93	5.24	3
208	17 Hydræ	11 24	118 20	6 = 6	30.2	5.11	3	8.92	5.11	4
209	h. 4455	11 28	122 38	6 9	244.9	6.92	7	3.98	6.96	6
210	B. 3706	11 32	152 32	7′ 8′	275.6	8.09	2	25.97	8.09	2
211	β. Hyd. Crat.	11 44	122 58	5 5	339.6	5.78	20	2.03	5.92	15
					338.3	4.47	6			
Do.	Sub-epochs				339.3	5.23	6			
					340.4	6.68	6			
					342.2	8.09	2			
212	B. 3828	11 47	151 38	8 9′	265.8	8.09	2	17.73	8.09	2
213	Δ. 116	11 48	121 19	8 8	83.1	6.41	6	20.98	6.44	3
214	ε. Chamæleontis	11 51	167 16	6 6′	178.4	5.93	5	1.58	6.48	3
215	h. 4487	11 52	125 48	10 10	124.7	6.49	2	5.65	6.49	1
216	B. 3904	11 56	151 3	8 8	150.4	7.27	5	23.48	7.30	6
—	A C	......	......	8 10	19.7	7.23	4	26.62	7.23	4
217	h. 4495	11 57	122 0	7 10	313.8	6.21	6	7.09	6.21	4
218	h. 4522	12 16	158 32	8 9	67.2	7.30	6	13.41	7.30	4
219	α Crucis	12 17	152 9	2 2′	120.6	5.33	50	5.65	6.36	26
					121.5	4.39	11			
					120.9	5.17	15			
	Sub-epochs				120.6	6.18	13			
					119.9	7.18	5			
					120.0	8.08	6			
	Do. A C	......	......	....	201.5	6.43	13	90.69	6.75	7
220	δ Corvi	12 21	105 34	3′ 10	213.0	7.48	3	23.44	7.48	2
221	γ Centauri	12 32	138 1	4 4	354.3	5.89	13	0.75	5.90	0
—	Sub-epochs				351.6	5.32	7			
					357.3	6.38	6			
222	Σ. 1669	12 32	102 5	7 7	122.3	7.31	6	7.32	7.28	6
223	γ Virginis	12 33	90 31	4′ 4′	43.1	4.37	16	1.51	4.39	3
	2d epoch				34.9	4.54	16			
	3d ,,				21.5	5.11	12			
	4th ,,				237.5	8.08	2			
224	h. 4556	12 45	117 2	8 10	80.4	6.98	8	7.05	7.04	5
225	h. 4558	12 47	119 13	9′ 9′	178.3	6.86	4	22.99	7.03	3
226	Δ. 127	12 50	144 59	8 9	126.1	7.34	5	16.57	7.34	5
227	h. 4563	12 52	122 42	7 9′	236.8	7.35	6	6.55	7.35	6
228	ξ^2 Centauri	12 57	139 0	5 10	100.3	6.51	5	6.01	6.28	4
229	θ Muscæ	12 57	154 24	6′ 9	187.5	6.38	10	5.82	6.67	7
230	η Muscæ	13 4	156 58	5′ 8	332.2	6.12	12	59.86	6.27	9
231	h. 4580	13 13	137 40	8 8	10.2	6.19	1	0.50	6.19	0
232	h. 4586	13 16	156 59	7′ 10	150.1	7.45	3	3.67	7.44	2
233	R. 17	13 21	152 10	7′ 8′	358.2	7.28	6	16.94	7.25	6
234	f Hydræ	13 27	115 37	6 7	191.5	4.71	9	10.04	4.49	9
235	Q Centauri	13 31	143 42	6 7′	164.0	5.40	7	5.38	5.38	3
236	Δ. 142	13 33	148 22	7 8′	90.4	6.37	4	32.92	6.72	3
237	h. 4607	13 32	161 8	8′ 9′	76.3	7.29	6	11.40	7.31	5
238	Δ. 143	13 37	151 14	8 8′	35.8	6.88	5	12.73	7.08	5
239	Δ. 144	13 39	136 31	8 9′	256.4	6.92	6	9.25	7.10	4
240	R. 18	13 41	141 58	6 8	288.9	7.32	6	18.26	7.31	6
241	Δ. 145	13 42	156 8	8 9	50.4	7.07	9	24.51	7.22	8
242	k Centauri	13 42	122 8	6 7′	112.7	6.57	14	8.82	6.90	10
243	h Centauri	13 43	121 5	5 10	185.6	7.47	4	13.76	7.47	4
244	h. 4634	13 46	145 12	7′ 9	310.0	5.63	7	11.46	5.81	4
245	Δ. 154	13 55	125 43	8 9	131.1	6.81	5	21.64	7.09	3
246	Δ. 155	13 56	142 52	7′ 8	27.7	7.02	5	24.51	7.02	5
247	h. 4651	13 58	140 42	6 9	134.0	7.12	5	62.67	7.12	5
248	Σ. 1807..	14 3	92 31	8′= 8′	26.9	7.48	3	7.93	7.48	3

No.	Name of Star.	R A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
249	h. 4671	14 9	169 19	8′ 9	127.4	6.84	4	5.83	7.04	3
250	Y Centauri	14 11	147 40	6 8′	163.2	6.55	8	9.63	6.74	7
251	Σ. 1833	14 14	96 59	7′ = 7′	164.0	7.48	3	6.25	7.48	3
252	Σ. 1837	14 16	100 49	7′ 9	321.5	7.48	2	1.25	7.48	0
253	h. 4687	14 25	125 49	9′ = 9′	82.5	7.32	4	2.17	7.21	3
254	h. 4691	14 27	144 57	9 9′	269.3	7.29	2	10.31	7.29	2
255	α Centauri	14 28	150 8	1 2	219.6	6.05	66	16.52	6.60	36
	Sub-epochs				218.5	4.79	19	17.43	4.68	11
					219.5	5.86	25	*	*	*
					220.7	7.34	22	16.12	7.44	25
256	h. 5444	14 29	144 12	9 10′	70.1	7.39	2	20.23	7.39	2
257	α Circini	14 29	154 14	4 9′	243.8	7.11	11	15.63	7.05	10
258	Δ. 168	14 31	154 27	8 8′	204.1	7.14	8	6.70	7.22	6
259	54 Hydræ	14 36	114 43	6 8′	134.2	5.37	9	9.19	5.47	11
260	h. 4706	14 40	136 42	7′ 10	217.4	6.99	5	7.13	7.05	6
261	h. 4707	14 40	155 42	8 8	225.2	7.47	3	1.50	7.55	2
262	Δ. 171	14 42	135 9	7 10	224.2	7.39	6	16.80	7.39	4
263	h. 4712	14 43	114 44	8 8′	227.3	5.39	5	6.27	5.43	1
264	h. 4715	14 45	137 11	6′ 7	277.8	5.96	9	3.04	6.18	9
265	H. 145, 28	14 48	110 38	5′ 7	277.4	6.66	5	12.08	7.06	5
266	π Lupi	14 54	136 23	5′ = 5′	111.1	6.11	18	0.75	5.24	5
	Sub-epochs				112.8	5.37	10			
					108.6	7.04	8			
267	κ Lupi	15 0	138 5	5 6′	144.2	7.13	8	27.21	7.06	9
268	Δ. 179	15 3	132 43	7′ 9	46.9	6.97	6	10.64	7.13	6
269	μ′ Lupi	15 7	137 15	6 = 6	173.6	6.28	15	2.08	6.83	6
270	Δ. 180	15 7	137 15	5 8	131.3	6.39	8	22.93	6.96	7
271	γ Circini	15 10	148 42	5′ 6	108.5	6.33	9	1.26	7.77	3
272	ε Lupi	15 11	134 4	4 9′	174.9	7.26	10	26.35	7.27	9
273	Δ. 183?	15 14	128 6	5 9′	298.7	6.39	1	89.48	6.39	1
—	A C	......	......	5 9′	45.9	6.39	1	144.50	6.39	1
274	h. 4766	15 15	132 15	8′ 10	118.3	7.41	6	13.12	7.42	5
275	h. 4771	15 17	147 30	8 9	188.1	7.16	9	5.91	7.38	7
276	h. 4772	15 17	140 50	8 12	249.9	6.94	3	12.60	7.54	1
277	h. 4776	15 19	131 20	7 9′	224.2	5.94	6	5.95	5.94	4
278	h. 4777	15 19	146 49	7′ 9′	301.7	7.10	6	6.33	7.27	4
279	Δ. 186	15 20	147 38	8 8	114.1	7.54	2	39.25	7.54	3
280	h. 4784	15 22	137 0	7′ 10	238.2	6.96	6	34.15	7.31	5
281	h. 4783	15 22	109 35	6 10	281.7	6.80	6	11.06	6.78	3
282	S. 673	15 23	113 54	8′ = 8′	120.5	5.60	15	9.55	5.78	11
283	γ Lupi	15 24	130 35	4 = 4	94.1	5.86	32	0.84	5.24	2
	Sub-epochs				94.3	5.05	19			
					93.8	7.04	13			
284	h. 4788	15 24	134 23	5 9	349.0	6.62	5	3.14	6.42	3
285	Δ. 190	15 26	147 33	7′ 10′	94.7	4.31	1	....	..	..
286	Σ. 1962	15 29	98 13	7′ 7′	7.9	7.54	3	12.20	7.54	3
287	h. 4796	15 31	148 9	8 8′	116.6	6.65	9	34.18	6.87	4
288	R. 20	15 32	154 54	7 = 7	155.9	5.35	7	2.42	5.34	3
289	h. 4805	15 37	142 41	6 11	132.3	6.88	4	32.91	7.03	3
290	Δ. 193	15 38	144 32	6 10	21.9	6.35	6	23.17	6.67	3
291	h. 4809	15 39	150 10	7 9	50.9	6.24	2	43.47	6.24	1
—	A C	......	......	7 9	257.0	6.24	1	49.30	6.24	1
292	Δ. 195	15 42	139 49	7 8	10.7	6.31	9	12.38	6.61	5
293	ξ Lupi	15 46	123 28	6 6′	49.3	5.54	10	11.03	5.76	7
294	h. 4821	15 48	121: 32	8 8	145.1	6.38	6	19.22	6.38	2
295	η Lupi	15 49	127 54	4 8′	22.2	4.68	9	15.07	4.59	4
296	h. 4825	15 50	147 17	6 10	251.6	6.37	6	10.24	6.85	4
297	ξ. 51. Libræ	15 55	100 54	5′ 5′	10.1	5.40	22	1.41	4.85	2
	Sub-epochs				8.3	4.45	6			
					10.6	5.39	13			
					11.4	7.33	3			
	A C	......	......	5′ 9	77.2	4.35	2	....	..	..
298	β Scorpii	15 56	109 20	3 5′	25.6	6.63	5	13.65	6.79	6
299	h. 4830	15 56	132 32	9 10	232.7	4.35	3	21.21	4.35	1
300	Δ. 199	15 58	128 39	7 7′	185.2	5.92	6	45.03	6.46	6
301	h. 4837	16 1	133 12	9 9	75.4	5.43	6	10.02	5.10	3
302	12. Scorpii	16 2	117 58	6′ 10	81.7	4.78	7	4.62	4.69	3
303	h. 4840	16 6	124 23	9 10	292.8	6.82	4	5.14	7.07	4
304	Δ. 200	16 11	133 30	6 10	198.1	6.93	4	42.85	7.08	3
305	h. 4845	16 12	130 50	8 9	135.0	6.45	2	1.20	6.49	1
306	ι Triang. Austr.	16 12	153 39	6 11	27.2	6.91	5	24.66	6.49	1
307	h. 4848	16 13	122 48	7 7	155.0	6.55	11	6.04	7.20	7

No.	Name of Star.	R A. 1830.0. h. m.	N P D. 1830.0. ° ′	Magnitudes.	Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
308	h. 4850	16 14	119 18	6′ 7′	348.3	5.93	10	7.54	6.04	9
309	ε Normæ	16 15	137 10	5′ 7′	335.2	6.01	10	23.87	6.64	5
310	5 Ophiuchi	16 15	113 3	6 6	1.9	4.78	5	4.11	4.35	4
—	A C	......	......	6 8	2.2	5.43	1	....	..	..
—	A D	......	......	6 8	286.6	5.43	1	....	..	..
311	Δ. 203	16 18	150 30	8 8	248.9	6.88	4	36.18	6.88	2
312	Δ. 202 ?	16 20	131 28	6 11	180.4	6.64	2	52.48	6.64	1
313	h. 4866	16 26	146 39	7′ 8′	125.8	6.14	8	3.98	6.70	6
314	h. 4871	16 27	137 26	7 10	47.3	6.87	10	27.82	7.04	7
315	h. 4873	16 27	139 1	8 8′	72.0	6.81	7	31.80	7.04	6
316	h. 4876	16 28	138 25	6 7	265.1	6.98	5	9.83	7.18	5
317	h. 4880	16 30	136 3	8 11	151.0	7.35	2	31.86	7.35	2
318	h. 4883	16 33	132 4	8′ 9	185.4	6.88	3	10.96	6.52	2
319	Δ. 210	16 34	145 3	......	173.9	6.39	2	....	..	..
320	Δ. 209	16 37	126 34	7′ 8′	147.3	6.82	8	23.21	7.39	5
321	h. 4889	16 40	127 12	6 10	5.0	5.36	5	7.24	5.39	2
322	h. 4890	16 41	136 37	7′ = 7′	147.6	6.73	5	31.07	7.09	4
323	h. 4896	16 44	136 34	7′ 10	28.0	6.35	7	4.39	6.49	4
324	h. 4909	16 51	140 50	8 8′	284.4	6.52	6	16.46	6.33	4
325	Δ. 213	16 58	136 31	7′ 9′	166.1	6.47	6	8.65	6.47	2
326	36 Ophiuchi	17 5	116 21	6 = 6	43.5	5.19	17	4.97	5.02	11
327	h. 4938	17 8	146 16	8′ 8′	108.4	5.89	6	24.56	5.89	2
328	h. 4939	17 9	146 17	8 9	224.4	5.89	6	30.77	5.89	4
329	h. 4947	17 14	171 47	9 9′	75.5	6.52	4	10.63	6.51	3
330	h. 4949	17 14	135 41	6 7	267.4	6.40	12	3.23	6.72	3
—	Δ. 216 = A C	......	......	6 7	313.5	6.81	5	104.01	6.66	4
331	Δ. 217	17 17	133 49	6′ 9	171.3	6.25	5	14.55	6.85	5
332	h. 4975	17 34	145 20	6′ 10	115.7	5.37	2	} 1.51	7.66	1
	2d epoch	......	......	....	81.3	7.66	2			
333	h. 4978	17 37	143 32	6 11	269.5	4.92	4	12.14	4.77	3
334	h. 4982	17 38	138 13	7 10	59.7	7.42	5	42.91	7.42	3
335	Δ. 219	17 47	126 50	5′ 7′	265.1	6.87	4	47.10	6.87	2
336	h. 5000	17 48	126 55	7′ 10	107.3	6.96	5	6.84	7.03	3
337	h. 5003	17 48	120 14	6 7′	107.1	6.84	5	6.20	6.68	6
338	h. 5005	17 49	135 48	7′ 9	28.2	7.23	8	26.83	6.15	7
339	h. 5013	17 55	133 24	6′ 6′	69.0	6.67	5	0.67	6.42	2
340	70 Ophiuchi	17 57	87 27	5 8	132.5	4.61	3	....	..	..
	2d epoch	......	......	....	129.3	6.77	7	6.98	6.65	10
341	h. 5023	17 59	130 37	8′ 8′	276.1	6.85	9	9.30	7.12	5
342	h. 5025	17 59	130 39	9 9	100.5	6.55	5	47.93	6.51	2
343	h. 5032	18 2	133 14	7 10	335.8	7.66	2	1.50	7.66	0
344	h. 5034	18 4	136 4	8 9	90.1	6.89	5	1.92	6.50	2
345	h. 5038	18 6	161 51	8′ 10	300.4	6.87	7	11.78	6.92	4
346	Δ. 220	18 8	145 38	7′ 8	179.6	6.11	11	31.52	6.16	8
347	Δ. 221	18 12	134 11	5′ 10	164.5	7.07	5	76.34	6.98	2
348	Σ. 2306	18 13	105 11	8 = 8	35.5	7.48	3	13.06	7.48	3
349	Σ. 2313	18 16	96 41	7′ 9′	197.6	7.20	3	5.25	6.65	1
350	κ Coronæ Austr.	18 22	128 50	6 7	359.3	6.56	9	21.78	6.95	5
351	h. 5055	18 30	143 1	8 8	75.5	7.66	1	7.39	7.67	2
352	h. 5056	18 31	145 50:	7 10	198.8	5.92	6	32.43	6.45	3
353	Δ. 224	18 41	137 28	7 = 7	63.7	5.66	10	82.12	5.21	4
354	h. 5075	18 48	154 1	8′ 8′	108.6	5.52	4	1.86	5.45	1
355	B. 6556	18 50	127 17	7 7	282.5	7.66	3	12.98	7.66	3
356	γ. Coron. Austr.	18 55	127 18	6 = 6	37.1	4.47	3	} 2.66	7.21	9
	2d epoch	......	......	....	36.8	5.55	5			
	3d ,,	......	......	....	34.5	6.43	3			
	4th ,,	......	......	....	32.7	7.43	14			
357	Δ. 225	18 59	142 4	7 8	252.9	6.44	4	69.58	6.77	3
358	h. 1367	19 1	107 43	8 9′	61.8	6.76	5	15.02	6.89	3
359	β Sagittarii	19 10	134 46	4′ 8	78.6	5.01	4	29.09	5.51	4
360	h. 5114	19 14	144 39	6 11	131.0	7.66	1	1.75	7.66	0
	A C	......	......	6 7	270.7	7.66	1	69.43	7.66	1
361	h. 5117	19 16	134 13	8 10	265.1	6.55	5	6.03	7.04	6
362	h. 5140	19 34	155 19	8′ 8′	89.6	6.94	6	1.78	7.09	4
363	Δ. 227	19 39	145 24	6′ 7	150.7	4.77	8	23.04	5.18	7
364	Δ. 229	19 45	142 21	7 7′	243.9	5.49	4	82.69	5.49	2
365	h. 5177	20 1	147 28	8 8	29.3	5.68	8	8.39	6.55	5
366	Δ. 230	20 6	130 42	7′ 8	115.0	6.61	6	11.35	6.57	6
367	Δ. 231	20 17	161 45	7′ 8	65.0	6.50	2	116.98	6.50	2
368	Δ. 232	20 17	165 55	6′ 7	17.2	6.16	7	18.70	6.34	5
369	ρ Capricorni	20 19	108 22	5′ 8	177.5	6.73	5	4.15	6.53	6
370	o Capricorni	20 20	109 9	7 7′	239.3	6.09	4	22.27	6.23	8

No.	Name of Star.	R A. 1830.0. h.	m.	N P D. 1830.0. °	′	Magnitudes.		Angle of Position.	Epoch 1830+	Value.	Distance.	Epoch 1830+	Value.
371	h. 5204	20	20	135	55	8	9′	34.6	6.16	6	6.24	6.53	6
372	R. 26	20	37	153	3	7	7	101.4	5.10	4	3.23	5.56	1
373	h. 5224	20	39	124	23	5	11	164.5	5.61	2	21.71	5.61	1
374	h. 5231	20	42	161	4	8	8′	110.8	6.62	8	7.62	6.59	6
375	Δ. 236	20	49	133	39	7′	7′	254.9	6.61	5	60.00	6.62	6
376	h. 5252	21	2	105	43	8	8	328.0	6.13	2	2.12	6.64	1
377	θ Indi	21	8	144	9	5	10	307.0	4.52	9	3.67	4.49	3
378	h. 5262	21	10	170	46	6	11	92.4	6.16	2	24.22	7.53	1
379	h. 5267	21	15	136	47	7	11	56.7	4.48	1	5.00	4.48	0
—	A C	......		......		7	9′	183.4	4.48	1	....	..	..
380	λ Octantis	21	23	173	29	6	9	82.9	5.57	8	3.38	5.13	7
381	h. 5282	21	28	107	10	9′	10	80.3	6.64	2	17.99	6.64	1
382	h. 5284	21	28	107	4	8	10	268.9	6.64	2	51.02	6.64	1
383	B. 7080	21	37	138	4	6′	9′	14.2	6.65	4	30.30	6.65	4
384	h. 5309	21	47	141	53	10	10	169.2	4.55	1	10.14	4.55	1
385	(*Doubtful*)	21	48	105	56	6′	10′	319.9	7.07	3	19.79	5.61	1
386	h. 5316	21	55	149	54	8	10	142.2	4.60	2	2.00	4.55	0
—	A C	......		......		8	8	190.8	4.64	1	....	..	..
387	h. 5317	22	1	149	40	9	10	100.2	5.18	5	15.53	5.08	2
388	h. 5319	22	2	129	9	8 =	8	110.4	6.12	8	1.72	5.41	6
389	Δ. 238	22	11	165	52	6′	9′	82.9	6.24	6	18.09	6.13	3
390	δ Tucanæ	22	15	155	50	4′	10′	282.3	6.16	6	6.84	5.98	3
391	δ^2 Gruis	22	20	134	37	5	9′	215.7	6.66	6	61.26	6.63	4
392	ζ Aquarii	22	20	90	53	5′	5′	352.0	6.25	9	3.91	6.61	8
393	β Pisc. Aust.	22	22	123	13	4′	8	173.3	6.20	6	29.09	6.29	5
394	Δ. 241	22	27	122	33	6	7	30.7	4.78	3	87.01	4.78	1
395	h. 5354	22	29	148	43	9	9′	71.7	4.55	1	43.64	4.55	1
396	Δ. 242	22	30	119	14	6	7	159.7	7.25	5	85.31	6.64	0
397	h. 5356	22	30	119	15	7	9	57.6	7.41	7	4.36	7.50	5
398	Σ. 2943	22	39	104	55	6	9′	113.7	5.76	3	30.86	5.76	1
399	22. Pisc. Aust.	22	43	123	47	4′	10	276.8	5.55	5	3.59	5.55	1
400	h. 5373	22	50	155	11	7′	10	99.6	6.57	3	48.89	6.57	2
401	Σ. 2970	22	54	102	12	8′	9′	36.3	7.80	2	8.87	7.80	3
402	Δ. 246	22	57	141	36	6′	7	260.5	5.69	9	8.12	6.94	4
403	Δ. 245	22	58	150	39	7′	10	291.2	6.16	6	15.07	6.49	5
404	Σ. 2988	23	2	102	50	7′ =	7′	100.2	7.80	2	3.43	7.80	2
405	Σ. 2993	23	5	99	51	7	7′	176.7	7.80	3	25.74	7.80	3
406	σ. 776	23	7	100	0	5′	10	311.5	7.80	3	49.29	7.80	3
407	h. 5392	23	9	149	14	8	9′	19.7	5.28	4	6.96	5.91	1
408	Σ. 2998	23	11	104	22	6	9	343.6	7.79	2	14.75	7.79	1
409	Δ. 248	23	11	141	14	6	9′	211.5	6.91	8	16.87	6.96	7
410	Δ. 249	23	14	144	45	6	7′	213.5	5.18	7	27.13	5.11	4
411	Σ. 3008	23	14	99	24	7′	8	90.2	7.80	2	6.88	7.80	2
412	h. 5397	23	15	105	25	7	9	330.0	5.76	2	61.76	5.76	1
413	h. 5403	23	25	155	38	7	10	48.4	6.02	9	42.47	5.89	5
414	θ Phœnicis	23	30	137	35	6	7	268.8	5.40	9	4.47	6.50	5
415	B. 7342	23	46	117	59	6′	7	267.5	5.17	4	6.88	5.04	3
416	h. 5435	23	48	107	6	9	9′	2.7	5.76	1	12.00	5.76	0
417	h. 5440	23	54	118	4	8′	9	285.1	4.78	2	3.63	4.78	2

COMPARISON OF ANGLES OF POSITION OF DOUBLE STARS,

MEASURED WITH

THE SEVEN-FEET EQUATORIAL AND THE TWENTY-FEET REFLECTOR.

(167) When we compare the results of micrometric measurement, as respects the angles of position, given in the above synoptic table, with the mean results of the angles for the same stars, afforded by the twenty-feet position micrometer in the ordinary course of sweeping, material discordances will be found in a great many instances, such as cannot wholly be accounted for, either by the comparatively greater attention to precision in this respect in the equatorial measures, and the greater time and care bestowed on them, or on the greater number of measures usually taken with the latter instrument. It is true that several cases of great disagreement may be perfectly well accounted for in this way, when the closeness of the stars measured, their inequality, and even the difficulty of seeing them at all with the smaller instrument are taken into the account. But on subjecting the matter to a more particular examination, it becomes very evident that these causes alone are not sufficient to account for the discordances—and that there exists *a systematic bias*, from whatever cause arising, which has affected all the twenty-feet measurements (as compared with the equatorial)—and *that differently, according to the different direction of the small star with respect to the large one.* What is more singular, and, indeed, so far as I see, unaccountable, is, that neither the *amount* nor *direction* of this bias is the same for all the four quadrants of position, nor is it even the same in the same direction for positions differing by 180°. That the eyes of different persons do not judge with equal certainty of parallelism, is notorious—as well as that the two images of one and the same straight line, seen with the right and left eye, are not parallel. If we attempt to place a ruler parallel to the edge of a paper, we shall find that a material difference in the accuracy with which we shall do it by the judgment of the eye alone is made by the situation of the paper with respect to the vertical or principal section of the eye—and it would appear from the facts in question, that our judgment of parallelism is liable to be greatly affected also by the different attitude of the person generally, and especially by the difference between looking *up* and *down*. Such at least is the best account I have been able to give to myself of the cause of the systematic discrepances alluded to. Their law and amount can only be made out inductively, by the assemblage of the totality of instances,* where stars have been measured with both instruments, such as is presented in the following table :—

* Quick moving Binary Stars are excluded from this comparison, so are Rough Measures and Estimates.

The numbers in column 1, are those of the Synoptic Catalogue of Measured Double Stars.

No.	Equ. °	Refl. °	R—E. °	No.	Equ. °	Refl. °	R—E. °	No.	Equ. °	Refl. °	R—E. °
2	172.2	170.5	− 1.7	118	17.1	12.1	− 5.0	219	120.6	117.8	− 2.8
3	164.2	169.4	+ 5.2	—	216.9	206.8	−10.1	221	354.3	340.8	−13.5
4	247.6	247.2	− 0.4	119	100.8	100.0	− 0.8	222	122.3	125.3	+ 3.0
5	63.0	61.6	− 1.4	120	132.9	134.3	+ 1.4	224	80.4	83.6	+ 3.2
6	79.2	76.8	− 2.4	121	220.0	215.3	− 4.7	225	178.3	182.0	− 3.7
8	126.8	127.8	+ 1.0	123	323.1	325.2	+ 2.2	226	126.1	128.8	+ 2.7
9	244.0	239.1	− 4.9	124	81.1	82.6	+ 1.5	229	187.5	186.0	− 1.5
11	16.4	11.7	− 4.7	125	115.2	110.9	− 4.3	234	191.5	193.1	+ 1.6
12	347.5	341.7	− 5.8	126	46.9	43.2	− 3.7	236	90.0	89.8	− 0.2
16	104.6	103.7	− 0.9	127	359.7	354.4	− 5.3	237	76.3	76.1	− 0.2
17	122.3	120.0	− 2.3	131	88.5	84.6	− 3.9	238	35.8	35.8	0.0
19	69.6	72.5	+ 2.9	133	80.5	86.3	+ 5.8	239	256.4	259.6	+ 3.2
21	37.6	30.3	− 7.3	134	220.2	218.5	− 1.7	240	288.9	285.8	− 3.1
23	134.8	137.8	+ 3.0	135	9.5	6.3	− 3.2	242	112.7	112.2	− 0.5
24	268.5	271.3	+ 2.8	136	297.8	292.1	− 5.7	243	185.6	183.6	− 2.0
25	241.7	241.1	− 0.6	137	23.2	17.5	− 5.7	244	310.0	310.6	+ 0.6
26	9.7	10.6	+ 0.9	141	146.6	146.3	− 0.3	245	131.1	129.5	− 1.6
31	185.1	183.8	− 1.3	142	146.8	141.0	− 5.8	246	27.7	27.1	− 0.6
33	81.5	81.8	+ 0.3	143	55.0	52.7	− 2.3	249	127.4	128.5	+ 1.1
34	70.7	68.7	− 2.0	144	350.3	347.8	− 2.5	250	163.2	164.2	+ 1.0
35	310.0	306.1	− 3.9	145	242.3	237.6	− 4.7	251	164.0	165.4	+ 1.4
38	102.3	99.5	− 2.8	—	39.9	37.2	− 2.7	253	82.5	80.8	− 1.7
40	42.1	41.5	− 0.6	147	221.9	220.2	− 1.7	254	269.3	270.0	+ 0.7
41	326.6	327.1	+ 0.5	148	226.1	216.4	− 9.7	255	219.6	215.3	− 4.3
43	344.8	346.8	+ 2.0	149	309.8	309.3	− 0.5	257	243.8	244.3	+ 0.5
44	11.3	4.3	− 7.0	150	60.8	61.4	+ 0.6	259	134.2	136.8	+ 2.6
45	199.7	199.9	+ 0.2	151	110.1	108.1	− 2.0	260	217.4	217.4	0.0
46	136.3	136.7	+ 0.4	—	354.3	357.3	+ 3.0	261	225.2	219.7	− 5.5
47	112.8	113.5	+ 0.7		217.1	217.6	+ 0.5	262	224.2	224.5	+ 0.3
51	148.3	153.2	+ 4.9	152	145.5	144.0	− 1.5	263	227.3	222.9	− 4.4
52	289.6	285.5	− 4.1	153	356.5	351.4	− 5.1	264	277.8	273.1	− 4.7
55	231.8	226.1	− 5.7	154	75.0	71.7	− 3.3	265	277.4	279.7	+ 2.3
56	184.1	178.0	− 6.1	156	216.6	213.6	− 3.0	266	111.1	109.8	− 1.3
59	170.9	173.9	+ 3.0	158	18.3	9.4	− 8.9	267	144.2	144.2	0.0
61	81.2	81.1	− 0.1	162	210.6	209.9	− 0.7	270	131.3	136.5	+ 5.2
64	57.9	54.8	− 3.1	163	202.0	197.7	− 4.3	271	108.5	110.1	+ 1.6
65	150.8	152.6	+ 1.8	166	125.2	124.0	− 1.2	272	174.9	173.3	− 1.6
67	113.5	115.8	+ 2.3	169	239.1	238.9	− 0.2	274	118.3	128.5	+10.2
69	18.0	17.2	− 0.8	170	267.2	263.7	− 3.5	275	188.1	187.1	− 1.0
70	319.7	319.4	− 0.3	173	181.0	180.1	− 0.9	277	224.2	225.2	+ 1.0
72	315.2	315.3	+ 0.1	174	60.5	57.3	− 3.2	278	301.7	297.1	− 4.6
73	221.3	221.0	− 0.3	176	103.5	104.4	+ 0.9	282	120.5	121.2	+ 0.7
74	285.9	285.8	− 0.1	—	191.4	188.1	− 3.3	283	94.1	95.5	+ 1.4
75	226.5	222.8	− 3.7	177	219.6	215.2	− 4.4	285	94.7	94.3	− 0.4
77	171.8	173.2	+ 1.4	181	37.8	35.5	− 2.3	286	7.9	6.9	− 1.0
82	130.5	131.6	+ 1.1	183	164.4	160.7	− 3.7	288	155.9	156.7	+ 0.8
83	163.0	163.5	+ 0.5	184	164.8	160.3	− 4.5	290	21.9	18.6	− 2.3
85	224.1	223.6	− 0.5	187	37.7	36.3	− 1.4	292	10.7	10.3	− 0.4
86	52.3	51.5	− 0.8	189	105.1	105.1	0.0	293	49.3	47.2	− 2.1
90	317.0	319.8	+ 2.8	191	173.5	176.2	+ 2.7	295	22.2	22.0	− 0.2
92	276.1	276.9	+ 0.8	194	214.5	206.1	− 8.4	296	251.6	251.2	− 0.4
96	157.7	156.6	− 1.1	195	108.7	104.7	− 4.0	297	77.2	80.5	+ 3.3
97	74.9	77.3	+ 2.4	197	40.2	38.8	− 1.4	298	25.6	27.5	+ 1.9
100	224.8	221.7	− 3.1	—	285.6	282.1	− 3.5	301	75.4	78.2	+ 2.8
101	310.4	311.9	+ 1.5	201	285.8	275.8	−10.0	302	81.7	84.5	+ 2.8
102	67.6	63.0	− 4.6	202	131.0	130.5	− 0.5	303	292.8	293.3	+ 0.5
104	301.3	298.5	− 2.8	204	269.2	278.0	+ 8.8	305	135.0	140.5	+ 5.5
105	74.6	79.9	+ 5.3	205	288.5	280.0	− 8.5	306	27.2	22.4	− 4.8
107	16.1	13.5	− 2.6	206	296.7	292.2	− 4.5	307	155.0	156.5	+ 1.5
109	157.6	157.3	− 0.3	207	166.9	168.4	+ 1.5	308	348.3	352.1	+ 3.8
110	140.9	139.2	− 1.7	208	30.2	29.9	− 0.3	309	335.2	336.8	+ 1.6
112	51.8	50.4	− 1.4	212	265.8	263.7	− 2.1	310	1.9	2.1	+ 0.2
113	75.0	74.9	− 0.1	213	83.1	80.4	− 2.7	313	125.8	128.2	+ 2.4
115	258.0	255.9	− 2.1	215	124.7	127.4	+ 2.7	316	265.1	265.9	+ 0.8
116	299.6	298.1	− 1.5	218	67.2	61.8	− 5.4	318	185.4	183.4	− 2.0

No.	Equ. °	Refl. °	R—E. °	No.	Equ. °	Refl. °	R—E. °	No.	Equ. °	Refl. °	R—E. °
320	147.3	149.8	+ 2.6	361	265.1	267.7	+ 2.6	388	110.4	108.8	− 1.6
321	5.0	7.1	+ 2.1	362	89.6	89.3	− 0.3	389	82.9	83.9	+ 1.0
322	147.6	149.3	+ 1.7	363	150.7	148.3	− 2.4	390	282.3	282.8	+ 0.5
323	28.0	24.8	− 3.2	365	29.3	23.2	− 6.1	393	173.3	171.0	− 2.3
326	43.5	41.3	− 2.2	366	115.0	118.7	+ 3.7	394	30.7	32.4	+ 1.7
329	75.5	75.3	− 0.2	368	17.2	12.2	− 5.0	395	71.7	76.4	+ 4.7
330	267.4	268.0	+ 0.6	371	34.6	31.2	− 3.4	397	57.6	59.2	+ 1.6
331	171.3	169.9	− 1.4	372	101.4	98.9	− 2.5	399	276.8	275.0	− 1.8
333	269.5	267.0	− 2.5	373	164.5	168.0	+ 3.5	402	260.5	262.0	+ 1.5
336	107.3	117.4	+10.1	374	110.8	111.5	+ 0.7	403	291.2	288.7	− 2.5
341	276.1	275.9	− 0.2	375	254.9	254.5	− 0.4	405	176.7	176.1	− 0.6
344	90.1	93.0	+ 2.9	377	307.0	296.2	−10.8	406	311.5	310.7	− 0.8
345	300.4	302.1	+ 1.7	378	92.4	94.4	+ 2.0	407	19.7	18.3	− 1.4
346	179.6	178.7	− 0.9	380	82.9	81.0	− 1.9	409	211.5	208.2	− 3.3
350	359.3	359.8	+ 0.5	383	14.2	13.7	− 0.5	411	90.2	90.5	− 0.3
351	75.5	79.0	+ 3.5	384	169.2	169.2	0.0	414	268.8	270.0	+ 1.2
359	78.6	77.4	− 1.2	387	100.2	98.2	− 2.0				

(168) These differences being projected on a chart of engraved squares, an interpolating curve was constructed and read off, when the following table of reductions resulted.

R. °	E − R. °	R. °	E − R. °	R. °	E − R. °	R. °	E − R. °	R. °	E − R. °	R. °	E − R. °
0	+2.5	60	+1.0	120	−0.9	180	+0.8	240	+1.9	300	+1.4
10	+2.5	70	+0.6	130	−1.1	190	+1.5	250	+1.6	310	+1.6
20	+2.4	80	+0.3	140	−1.1	200	+2.2	260	+1.3	320	+1.9
30	+2.2	90	0.0	150	−0.9	210	+2.6	270	+1.2	330	+2.1
40	+1.9	100	−0.3	160	−0.6	220	+2.5	280	+1.2	340	+2.3
50	+1.5	110	−0.6	170	+0.1	230	+2.3	290	+1.3	350	+2.4
60	+1.0	120	−0.9	180	+0.8	240	+1.9	300	+1.4	360	+2.5

(169) This table exhibits what may be called the *Bias-correction* to be applied to the 20-feet positions; and the effect of this correction when so applied is to produce a much better general accordance, and an even distribution of positive and negative errors. In any case, then, where it may become necessary to call in the evidence of the 20-feet measured positions (which, be it observed, I do not recommend to be done in any case where deliberate and careful measures with an equatorially mounted instrument can be had), I consider it necessary to apply this correction. As an example, I shall take the 20-feet measures of the position of α Centauri, the mean of which for the mean epoch 1835.791 is 215° 16′. Now, when it is considered that in *this* instance none of the five 20-feet results obtained rest on single measures, and that, of all the eighteen individual measures concerned in producing it, the *highest* (217° 18′) falls materially short of the lowest of the mean epochal results of the equatorial measures, it will hardly be denied, 1st, that some distinct biassing cause must have existed to produce such a disagreement; and 2dly, that the tabular correction (+ 2° 33′) which brings up the deficient result to 217° 49′, if shown to rest on a large induction of instances extending over all kinds of stars, presented in all sorts of positions, is not only admissible, but essential. The result so corrected still falls short of the equatorial result for the same epoch (1835.791), viz., 219° 12′ by 1° 23′

which seems to indicate that the bias in question acted in the case of this fine star in a more positive and efficacious manner than in those of less conspicuous and closer objects. I should observe, however, that, in examining with care all the cases of comparison presented in the table, Art. 167, I have not found any distinct ground for concluding either the magnitudes of the stars or their distance (when well seen and well separated), to have exercised any systematic influence on the angles, or on the amount of the Bias correction.

(170) As it may fairly enough be presumed that this Bias, whatever its cause may be, acts equally on all angles of position measured in the same way, the positions of Saturn's satellites measured with the 20-feet will also stand in need of the same tabular correction to render them comparable with the measures which have been obtained with the equatorial, or which would have been obtained (in the case of the satellites not being visible in that instrument) had its optical powers been sufficient to show them. As the correction in the north preceding quadrant amounts at its maximum to $+ 2^\circ.6$, and in the south following to $- 1^\circ.1$, the total effect of the Bias in a whole revolution of a satellite is equivalent to a periodical inequality influencing the position to a total amount $= 3^\circ 42'$: the correction therefore becomes theoretically important, as indeed it would be in the rotatory movement of a double star if it continued to be so observed during a whole revolution.

SPECIAL REMARKS

ON THE

MEASURES OF PARTICULAR DOUBLE STARS

IN THE FOREGOING CATALOGUES.

(171) λ Toucani. R A $0^h\ 46^m$; N P D 160° 26′. The mean results of the measures for 1835, 6, 7, are as follows:—

1835.92	— Pos =	78 30
1836.73	"	80 18
1837.74	"	80 35

These angles indicate a direct movement. Mr. Dunlop states the quadrant in 1826 to have been s f, with a difference of declination of 6″.62. The actual difference of declination at the mean epoch 1836.78 is 3″.74 by calculation from the mean distance and position here given. As I can fully rely on my angles, I have no hesitation in supposing the quadrant for 1826 to have been mistaken. In that case, if the difference of declinations 6″.62 can be depended on, and the distance be supposed unaltered, the position in 1826 must have been somewhere about 71° 37′, which agrees well with the presumed direct motion. This star, therefore, deserves further attention as an instance of pretty rapid angular rotation. There are two 20-feet measures of this star which (corrected for Bias as per table p. 285) give for the epoch 1834.836 the angle of position 76° 51′, which agrees exceedingly well, both as regards direction and velocity, with the progress of the movements in the succeeding years, as above stated.

(172) *h*. 2036. R A $1^h\ 12^m$; N P D 106° 41′. The change of angle in a single year, if both my equatorial measures be correct, is so very great as to render it certain that this star is in a state of rapid rotation. The place being such as to admit of its being pretty well observed in northern latitudes, I have consulted former catalogues for observations of it. Struve's does not contain it; but in my 5th catalogue of double stars it occurs, with a mistaken degree in N P D, as *h*, No. 2036. Referring to the original sweep, the degree appears to have been erroneously cast up, and instead of 105 (as printed), should be 106. There can be, therefore, no doubt of the identity of the object—as the description (dist = 2″, magnitudes 8 = 8) agrees sufficiently well. The angle there assigned (53°.0) by a mean of two measures, corroborates the great angular movement, and agrees in direction. The observations collected run as follows:—

h. 2036. — 1830.786 —	Pos = 53°.00 —	Sweep 307.	
1835.717	"	45 .00	
1836.958	"	38 .05	

giving an angular motion of 14°.95 in 6.172 years, or — 2°.422 per annum. The faintness of the small star (9 m) renders the equatorial measures difficult, so that the angles are not to be considered as normal, but no doubt can remain as to a rapid rotation, and hardly any as to its being on the increase.

(173) p. Eridani. R A 1^h 33^m; N P D 147° 3′. The measures of 1834 give for their mean result a position of 122° 48′ for the mean epoch 1834.841, which, compared with the single night's measure of 1835 (1835.583 — Pos = 120° 25′), would indicate a considerable orbitual motion. Without desiring to attribute too much weight to this conclusion, I would remark that the tendency of the 20-feet measures lies in the same direction. They run as follows:—

Sweep 500. —	1834.758 —	Pos 120°.8	Mean	1834.800 —	Pos 120° 27′
504	34.821	120 .1			
732	36.693	119 .5		1836.723	119 30
735	36.753	119 .5			

These results are uncorrected for Bias (see p. 285), and the correction when applied tend rather to increase the disagreement of the absolute positions given by the two instruments. But, so far as any value at all can be attributed to them, they corroborate the orbitual motion contended for.

Mr. Dunlop has given measures of this star. His mean result for 1826 is 73° 6′ n f (= 16° 54′), which must surely indicate some great mistake. Were the measure really 73° 6′ s f (corresponding to a position = 163° 6′), a rotation in the same direction, but much more rapid in the interval, would account for it. But it is useless reasoning on such hypothetical data.

(174) *h.* 3823. R A 5^h 54^m; N P D 121° 4′. The mean positions and epochs for 1836 and 1837 are:—

1836.626. —	Pos = 128° 58′ —	(5)
1837.094	132° 2′	(5)

The star, however, appears to have been somewhat too faint for exact measurement with the equatorial, and the great difference of the measured angles for epochs, so near as 1836.988 and 1837.071 (Equatorial Measures Nos. 1292, 1293), throws a doubt upon the orbitual motion, which would otherwise seem to be very great. Still, I cannot but think that some such motion, and in this direction, must exist, the more especially as the 20-feet angles indicate a slight change in the same direction. The mean result of the 20-feet measures (when the Bias correction is applied) is 130° 30′, coinciding precisely with the mean equatorial result. This star belongs to that interesting class of objects whose colour deviates the same way from whiteness, like 61 Cygni and *α* Centauri.

(175) Δ. 70. R A 8^h 24^m; N P D 134° 10′. If any confidence can be placed in Mr. Dunlop's measure, this star must be in a state of rapid rotation, the difference of his position for 1826 (320° 18′) and mine for the mean epoch 1835.49 (350° 18′) amounting to 30°. For so distant a double star, this would, however, be an extraordinary rapidity of motion, and my measures, taken seriatim (1833.273 — 350° 7′, and 1836.994 — 351° 27′), though indicating a change in the same

direction, afford no corroboration of so remarkable an angular velocity. The 20-feet measures are too close together in date to be taken as evidence of change in their interval, and their actual difference lies the opposite way. Their mean (corrected for bias) is 350° 6′ for 1836.230, agreeing extremely well with the mean equatorial epoch 1835.49 — 350° 18′.

(176) *h.* 4128. R A $8^h\,36^m$; N P D 149° 43′. The measures of 1835 and 1837 differ by 5° 47′, but unfortunately they rely, each on only a single night's measure, and those of 1835 not good ones. Still some degree of direct orbitual motion, though perhaps not so considerable in amount, seems strongly indicated.

There is but one 20-feet observation of this star (in sweep 764). The position given by it (corrected for bias) is 222° 42′, differing only 0° 48′ from the mean equatorial result 221° 54′.

(177) *h.* 4130. R A $8^h\,37^m$; N P D 146° 57′. The difference of the measures of 1835 and 1837 is no less than 7° 50′, but the measure of 1835 is especially reprobated as too difficult, and in 1837 the star was not well seen. In fact, the object is beyond the fair reach of the equatorial, and from the 20-feet measure, which (corrected for bias) comes out 218° 54′, it is certain that the equatorial measure No. 1458 is entirely erroneous, and must be rejected.

(178) R. 9; R A $8^h\,41^m$; N P D 148° 6′. The comparison of the mean results for 1835 and 1837 indicate, with some certainty, a considerable angular motion.

$$\begin{array}{ll} 1835.914 - \text{Pos} = & 112°\ 18'\ (4) \\ \underline{1837.128} & \underline{109\ \ 11}\ (9) \\ +\ 1.214 & -3°\ \ 7' \end{array}$$

The 20-feet measures, it is true, indicate an opposite movement, but their evidence is not to be taken as destroying the weight of the above conclusion, though it renders it probable that the angular motion — 3° 7′ errs in excess. Meanwhile their mean (corrected for bias) comes out 289° 27′, which agrees within 40′ of our mean equatorial result, 110° 6′ = 290° 6′.

(179) *h.* 4249. R A $9^h\,42^m$; N P D 124° 14′. Here again the 20-feet measures of Sweeps 541 and 809 oppose the conclusion of angular movement, which else, from the consecutive progression of the results (Nos. 1504, 1505, 1506, equ. meas.) would appear satisfactorily enough made out. Probably all the measures are in error, and in such a case it is satisfactory at least to find the mean of the 20-feet results (corrected for bias as per table), viz.: 124° 57′— epoch 1836·54, agreeing within a quarter of a degree with that of the equatorial measures 125° 12′ — 1836.31.

(180) *υ* Argus R A $9^h\,43^m$; N P D 154° 17′. The difference of 3° 26^m, between the measure of 1836 and the mean result for 1837, would indicate, with considerable certainty, a direct angular motion to a large amount, but that the former rests only on a single night's observations.

(181) *β Hydræ and Crateris.* R A $11^h\,44^m$; N P D 122° 58′. The series of angles of position of this fine double star, for the sub-epochs, calculated in the Synoptic Table for 1834.47, 1835.23, 1836.68, and 1838.09—which are respectively 338°.3, 339.3, 340.4, and 342.2, place the binary nature and direct movement of this system beyond a doubt; the amount of motion being +3°.9 in 3.62 years, or +1°.077 per annum.

The 20-feet measures of this star run quite irregularly, and are evidently entitled to no reliance.

(182) *h.* 4495. R A $11^h\ 57^m$; N P D 122° 0′. The mean equatorial angle differs nearly 7° from the 20-feet result (duly corrected for bias). But the small star, in both the equatorial sets of measures, is noted as 10 m, a sufficient indication of the impracticability of measuring it in that instrument with any degree of certainty. It is probable that errors (arising from the inequality of these stars) exist in all the results.

(183) *α Crucis* R A $12^h\ 17^m$; N P D 152° 9′. This beautiful double star has attracted the attention of all the more recent southern observers. Lacaille does not notice, however, the fact of its being double, from which Mr. Rümker surmises that it may have been closer in his time than at present, which is rendered not improbable by a comparison of measures of its distance taken within the last twenty years. Mr. Rümker describes it as involved in a milk-white nebulosity (Preliminary Catalogue, pp. 15, 17), a description which I am at a loss to understand, unless it refer to the bright surrounding light of the Milky Way. At least I have never noticed any nebulous accompaniment to this star, on any of the very frequent occasions on which I have viewed it, or shown it to others.

(184) In attempting to trace the orbitual motion of the individuals of which this double star consists about their centre of gravity, we are deprived of any assistance from their catalogued differences of R A and N P D, by the absence of any such differences in Lacaille's catalogue, and by their precariousness in more recent ones. In such a case, micrometrical measurements only can be relied on, and of these I am not aware of the existence of any prior to those recorded by Mr. Dunlop in 1826. (Mem. Art. Soc. vol. iii.) Mr. Rümker, it is true, assigns 12″.3 as the Δ. R A in arc, and 4″.45 as their Δ. P D, but he does not state how these quantities were obtained, and it is to be presumed that they result from independent places of the stars. Comparing therefore only Mr. Dunlop's measures (their mean result and epoch) with my own, taken with the equatorial, we have as follows:

Authority.	Epoch.	Position.	Epoch.	Distance.
Dunlop, . .	1826.45	114° 24′	1826.23	5″.29
Herschel, . .	1835.33	120 36	1836.36	5 .65
	8.88	+6° 12′		

(185) If the position assigned by Mr. Dunlop can be entirely relied on, this comparison indicates an orbitual motion at the rate of + 0.698 per annum. This conclusion, however, is not reconcilable with the series of sub-epochs computed from the measures of the successive years 1834, 5, 6, 7, 8, as stated in the foregoing synopsis of my measures, which indicate with considerable decision, a much slower orbitual motion (— 0°.478 per annum), and in the opposite or retrograde direction.

(186) *α* Crucis is accompanied by five small stars to the southward, arranged in an irregular line concave towards the large stars. Of these, the principal and the most distant has been observed by Lacaille, and by most subsequent astronomers. Respecting the magnitude of this star there is a good deal of difference of statement. Lacaille calls it 7 m, Johnson 5, Fallows

and Taylor 4, Dunlop 6 or 6.7. In my equatorial observations it is marked 6 and 7, while (as might be expected), in the 20-feet it has been estimated at 5 m. Probably, therefore, 5.6 m is about the truth. It is its proximity to so bright a star as α Crucis which makes the estimation difficult. From the differences of the catalogued places by Lacaille, Fallows, Johnson, and Taylor, and from the micrometrical measurements of Mr. Dunlop and my own, the following may be stated as a synopsis of its computed, or measured position and distance. The micrometrically measured elements reckon from the larger star of the double star; those computed from the catalogued differences, from the middle between the two constituents.

Authority.	Epoch.	Position.	Distance.
Lacaille, . .	1750	215° 48′	92″.45
Fallows, . .	1824	203 12	92 .47
Dunlop, . .	1826	200 0	87 .29
Johnson, . .	1830	202 18	87 .99
Herschel, . .	1836.43	201 30	......
Ditto, . .	1836.75	......	90 .69

On the whole of this evidence it may be probably concluded that the small star in question has not materially changed its relative situation with respect to the large one, since there is reason to suppose that Lacaille's difference of Right Ascensions (— 7.60), from which the results for 1750 are calculated is too large. If this, however, be not the case, a difference of proper motions exists which carries the small star relatively in a direction nearly at right angles to the line connecting it with the great one.

(187) γ Centauri. R A. 12 32 N P D 138°.1′. The extreme closeness of the individuals of this remarkably fine, but difficult double star, which are equal, and each of the 4th magnitude, necessarily renders the positions precarious. Nevertheless, their assemblage in two sub-epochs, 1835.32 and 1836.63, so chosen as to divide the total value (13) of the whole series of measures equally between them, leaves no room to doubt of a very rapid direct angular movement, for we thus obtain the following data:

Sub-Epoch —	1835.32	— Pos	351° 35′ (7)
	1836.38		357 21 (6)
Interval,	1.06	Motion,	+5° 46′

which is at the rate of + 5°.440 per annum.

(188) γ *Virginis.* R A $12^h\ 33^m$ N P D 90° 31′. The apparent perihelion passage of this interesting double star took place in the first half of 1836, and the appulse of the two stars proved (as predicted) so very close as to cause it to appear as a single star to all but the most powerful and perfect existing telescopes under the most favourable circumstances. In no part of the interval from 1835.971 to 1837.545, both dates inclusive, was it possible to observe any *certain* elongation of the united discs with the 7-feet equatorial, capable of being in the smallest degree relied on for a measure. It should be observed, however, that owing to the influence of the arid and heated sandy tract intervening between Feldhausen and Table Bay, to the north-

ward of the former station, it was rare to procure even moderately tranquil images of stars situated so near the equator. In consequence, almost all the *measures* obtained of this star were procured only by the most obstinate patience and perseverance in waiting for favourable glimpses, occurring among long intervals of confused and agitated definition, as the notes appended to the individual night's results sufficiently show.

(189) During the interval between the dates above mentioned, the star was frequently examined. On the night of the 21st Dec. 1835, it was kept in view nearly an hour, trying all sorts of methods to divide it, but in vain.

"I see the disc round and sharp, though tremulous, and the rings &c. all in motion;—no power I can apply gives me the least certainty of an elongation. To this telescope, with its highest power and in good action, the star is single. (7 feet Equ.)"

Again, on the 23rd December, 1835, it was examined with all the usual powers up to 400.

"Definition very far superior to any I have ever had of this star since I have been at the Cape. Its disc, at the best moments, is seen steadily round. I can no way succeed in dividing it. When the focus is over-urged, to give the smallest disc, it was seen a little wedge-formed downwards, but turning the telescope in that state on Spica the same appearance was seen. This observation was made just before and during the morning twilight, and as the star gained altitude the definition continued improving."

"January 10, 1836. In the best moments I fancy I see a very trifling elongation—roughly about the direction of the meridian with 279 and 300." [400] "Worked at it a full hour, turned the object-glass and its cell in the tube half a turn round with remarkably good effect."

"February 9, 1836. In the commencement of twilight, in the thin scud of a black south-easter, which is beginning to bring up its cloud after a cloudless night, I feel pretty sure that there *is* an elongation as indicated. Pos 13° 50′ a single measure, with the lowest weight a *measure* can have."

February 18, 1836,—20-feet reflector. "Viewed γ Virginis with powers 320 and 480 which gave round discs and very good definition; but could get no indication of its being double. Far better defined than γ Centauri," which had just before been viewed with the same instrument, and which was seen well elongated, and in momentary glimpses separated with 320 and a triangular aperture.

May 3, 1836. "With the utmost patience and the greatest difficulty, from the violent agitation of the star, I think I have a measurable elongation. Pos = 5° 30′" (by a single measure).

May 12, 1836. "γ bears No. 4 better than usually No. 3, and I am almost sure it is elongated a very little." Pos = 3° 30′ (by a single measure marked $\pm$).

"January 14, 1837. Being a most glorious night, I waited till 10h. 20m. Sid. T, and then attacked γ Virginis. Capitally defined, though *catching*. Bore No. 4 well. In some moments I keep suspecting an elongation from *f* to *p*, but at others it is quite round. Put on aperture $2\frac{1}{2}$ inches—a beautiful planetary disc without rings. If it be elongated the major axis is not more than $\frac{1}{10}$ greater than the minor. In short, I came to the conclusion that for anything I could see to the contrary the star is single. In this state, turned the telescope on γ Centauri which the powers No. 3 and No. 4 distinctly elongate, consequently I conclude that the distance of γ is at most $\frac{1}{2}$, perhaps $\frac{1}{3}$ that of γ Centauri, which is certainly under 1″."

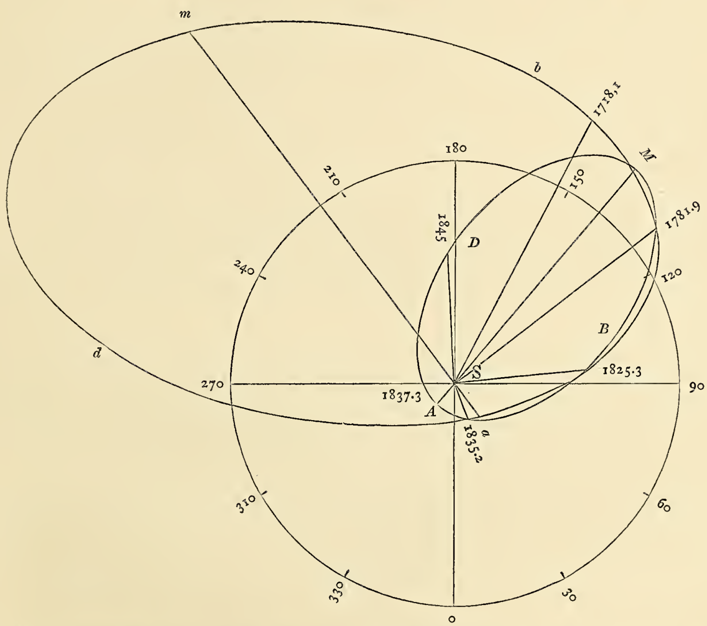
"April 24, 1837. The best sight of γ Virg. I have ever got since my residence at the Cape. Quite round with No. 4, nor the smallest sign of elongation that I can perceive. The rings *brandish* a little, but slowly, and the disc *moulds* a little, but it is altogether finely defined, and examined quite at ease. 2^h west of merid."

"May 18, 1837. Scarcely a doubt of elongation. Long contemplated with No. 4. It is surely not round, and position, by 3 measures, = 202° 0′. (Brandishing but a *disc*.) After an hour's rest of the instrument much less evidently elongated. Still I think it *is* so, but am by no means so certain as when first seen."

"June 27, 1837. I am almost certain of an elongation 60° $\pm$ n f or s p; but the star will not bear No. 4. No. 3 shows it round, but wants power. A reading (such as it was) of the micrometer taken, gave Pos = 211° 40′."

"July 19, 1837. Certainly elongated. Of this I have no doubt. The star is better defined than I ever saw it at the Cape under No. 4. Definition excellent—for *this* star unequalled. Pos. by a single reading 210° 20′. —Further examined. When best in focus, *i. e.* when disc reduced to its least magnitude, *perfectly round.* Turned the telescope on β Corvi and δ Corvi. In similar state of the focus I see the same elongation in the same direction, but when perfectly adjusted the discs are quite round, and so is that of γ Virginis."

(190) Such is the history of my observations of this star during its perihelion appulse. The *time* of the perihelion passage appears to have been retarded nearly two years beyond that predicted in my first calculation of the orbit, the elements of which, however, as subsequent observation has shown (with the exception of the excentricity), are incapable of representing the motion of the stars far beyond the limits for which they were calculated, however completely the conditions of it were satisfied by them within those limits. The reason of this abandonment of the old supposed orbit, and the substitution for it of one differing so very widely from it in all but the single element above mentioned, which the further progress of observation has necessitated will be readily understood by the inspection of the annexed figure, in which



M D A B represents the actual orbit described by the one star about the other at S, and m d a b the orbit represented by my first elements. It will be seen that the two orbits are almost exactly coincident over all that portion of each which corresponds to the interval

embraced by the observations from 1781 to 1835, within which alone, micrometrical measures had been at that time obtained—the actual or smaller ellipse being curiously packed within the other in the manner of an osculating curve, intersecting it in four points, and deviating from it in the intervals between them by a quantity much too small to excite any suspicion of error at that time.

(191) This is not the first by many instances in the history of scientific progress where, of two possible courses, each at the moment equally plausible, the wrong has been chosen. But in this case, the adoption of the larger ellipse seemed to be necessitated by the positions concluded from the observations of Mayer in 1756, and of Bradley in 1718, which it appeared desirable, if possible, to conciliate.* Now, however that micrometric measures have been sufficiently multiplied, positions obtained like that of Bradley by mere allineations with distant stars, one eye being at the telescope, the other directed to the heavens; or like that of Mayer, by a still more insecure method, viz., by independent differences of R A and P D taken from a catalogue, can by no means be admitted among the normal data to be used in the determination of elements.

(192) The lapse of a very few years sufficed to show that the movements of the stars are performed with much greater rapidity, and in a much smaller orbit than that at first assigned to them. Elements of their orbit have been computed from time to time by Messrs. Maedler, Encke, Captain Smyth, the late lamented Professor Henderson, and, recently, by Mr. Hind; also by myself, in 1843 (to which reference has been made by Captain Smyth, in his useful and elaborate work, "A Cycle of Celestial Objects," ii. p. 281). It is not a little remarkable that all these calculations agree in assigning almost precisely the same value to the *excentricity* (physically speaking, the most important of all the elements) as that resulting from my earlier calculations, though they differ materially from each other in the position of the orbit in space, and especially in the period; Captain Smyth's period still extending to 196 years, while, with a certain combination of other elements, so low a period as 124 years seemed to myself not absolutely excluded; at least if *all* the micrometrical observations on record be considered as entitled to equal credit.

(193) This, however, for reasons which will presently appear, I consider more than questionable; and as the complete establishment of the elliptic motion of this binary star is a point of high importance—one of the great facts indeed of modern astronomy—a re-investigation of its orbit, founded on careful examination of all the recorded measures will not be deemed irrelevant in this place. To this end there are assembled in the following table the mean results

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* In my earlier investigations of the orbit of this star, a mistake of 10° was committed in reading off from a celestial chart the angle of position of the two stars α and δ Virginis, with which Bradley compared the double star. Mr. Henderson has rectified this mistake. In consequence of it the agreement of my first orbit with Bradley's observations is only apparent, my calculated position for 1718 being 159° 17′, and the position actually resulting from Bradley's comparison (with the due corrections for precession and *ocular equation*) being 150° 52′, instead of 160° 52′, as set down in my paper (Mem. Art. Soc. 1832). It is remarkable, however, that Mr. Henderson deduces from his own elements, a position of 161° 16′ for the epoch in question, differing by less than 2° from my computation, though starting from such widely different elements. Both are erroneous, however, and this important observation of Bradley's will be found very satisfactorily represented by the elements about to be given further on.

of all the recorded observations of its angles of position (micrometrically measured) which had come to my knowledge up to Sept. 1845.

No.	t	θ	Obs.	No.	t	θ	Obs.	No.	t	θ	Obs.
1	1781.89	130° 44′	H	20	1832.30	69° 55′	D	39	1837.21	265° 27′	Sm
2	1803.20	120 15	H	21	.40	71 26	Sm	40	.41	257 55	Σ
3	1820.29	105 15	Σ	22	.52	73 30	Σ	41	.48	256 24	M
4	1822.25	103 24	Sh	23	1833.18	61 46	h	42	1838.08	237 28	h
5	.35	102 44	Σ	24	.30	61 9	D	43	.28	235 41	Sm
6	1825.32	96 53	S	25	.33	63 10	Sm	44	.32	233 26	D
7	.32	97 55	Σ	26	.37	65 32	Σ	45	.43	231 5	O
8	1828.35	90 30	h	27	1834.30	47 9	Sm	46	.43	229 12	M
9	.38	91 30	Σ	28	.31	46 48	D	47	1839.32	214 35	D
10	1829.22	87 43	h	29	.38	51 40	Σ	48	.40	217 12	Sm
11	.39	88 17	Σ	30	.41	39 0	h	49	1840.38	205 43	D
12	1830.38	82 5	h	31	.84	33 26	Σ	50	.45	205 42	O
13	.39	81 29	D	32	1835.11	21 27	h	51	1841.34	200 3	D
14	.59	82 10	B	33	.38	15 29	Σ	52	.35	200 11	M
15	1831.33	77 12	h	34	.40	14 59	Sm	53	1842.34	197 25	A
16	.35	78 12	D	35	1836.28	350 9	D	54	.41	194 59	D
17	.36	80 55	Σ	36	.34	349 48	Sm	55	1843.33	191 36	Sm
18	.38	77 54	Sm	37	.41	331 34	s	56	1845.34	185 24	Sm
19	1832.27	70 20	h	38	1837.20	280 25	E				

In this table, the positions set down on the authority of each observer (with exception of those of M. Struve in 1834) are the means of his recorded observations for each year. The first column contains a number for reference; the second, headed t, the mean epoch of observation; the third, headed θ, the angle of position corresponding, and the fourth, the initial of the observer's name.*

(194) If these positions be projected on a chart of engraved squares for the purpose of mutual intercomparison, in order to the construction of an interpolating curve representing the most probable course of the variation of this element during the whole interval of observation, it will at once be apparent that the observations of M. Struve from 1828.38 to 1834.38, both inclusive, cannot possibly be used in conjunction with the rest of the series. A curve drawn through the points representing these observations, separates itself gradually and systematically from that which expresses with the utmost consistency and regularity the general course of the movement as deduced from all the other authorities, the amount of deviation at length reaching no less than 9°, after which it ceases abruptly, the subsequent results of M. Struve's measurements, as well as those previous to 1828, being in good accordance with the rest, on their whole evidence, as so represented. This is clearly a case in which no middle course can be taken. To include these observations with the rest by a system of taking means, would be to sacrifice the validity of both series, and to mar the chain of data at a most important

* A. Airy; B. Bessel; D. Dawes; E. Encke; H. Sir William Herschel; h. Herschel, junior: M. Maedler; O. Otto Struve; S. South; Sm. Smyth; Σ. Struve; s. Sabler.

point of its history. I shall, therefore, proceed independently of them, and as it would be manifestly unfair in an investigation of this nature arbitrarily to retain some and reject others, among a series of results recorded by the same observer, shall leave, in what follows, M. Struve's measures out of consideration, proposing on another occasion to make them a subject of especial inquiry with a view to the determination of an orbit resting solely on their evidence.* The observation No. 53 having been made with a double image micrometer, giving confessedly distorted images, and standing, moreover, in irreconcilable contradiction to the general evidence of all the other observations from 1840 to 1845 inclusive, is also rejected.

(195) The following tables express, the first, a series of mean epochs and positions deduced by taking means of the observations of each year (with the exceptions specified); and the second, the course of the interpolating curve which on a general and perfectly impartial consideration of all their evidence, appears to me to exhibit the most probable course of the movement throughout (as deduced from observation without the aid of any elliptic hypothesis), and more especially during the year 1836, when, owing to the excessive closeness of the stars, all micrometrical measurement was, if not precluded, at least rendered liable to errors of unusual magnitude.

TABLE OF MEAN OBSERVED EPOCHS AND ANGLES OF POSITION OF γ VIRGINIS.

t	θ	Observ. used.	t	θ	Observ. used.	t	θ	Observ. used.
	° ′			° ′			° ′	
1781.89	130 44	1	1832.32	70 34	19, 20, 21	1838.31	233 22	42, 43, 44
1803.20	120 15	2	1833.27	62 2	23, 24, 25			45, 46
1822.25	103 24	4	1834.34	44 19	27, 28, 30	1839.36	215 53	47, 48
1825.32	96 53	6	1835.25	18 13	32, 34	1840.41	205 42	49, 50
1828.35	90 30	8	1836.31	349 58	35, 36	1841.34	200 7	51, 52
1829.22	87 43	10	1836.41	331 34	37	1842.41	194 59	54
1830.44	81 55	12, 13, 14	1837.30	267 25	38, 39, 41	1843.33	191 36	55
1831.35	77 46	15, 16, 18				1845.34	185 24	56

TABLE OF INTERPOLATED EPOCHS AND ANGULAR VELOCITIES OF γ VIRGINIS FOR ANGLES OF POSITION FROM 10° TO 10°.

θ	t	$-\frac{d\theta}{dt}$	θ	t	$-\frac{d\theta}{dt}$	θ	t	$-\frac{d\theta}{dt}$	θ	t	$-\frac{d\theta}{dt}$
°		°	°		°	°		°	°		°
130	1783.41	0.48	50	1834.04	18.2	330	1836.37	62.0	250	1837.72	34.5
120	1803.61	0.60	40	1834.51	23.3	320	1836.53	67.2	240	1838.04	28.0
110	1816.60	0.99	30	1834.90	29.4	310	1836.67	70.8	230	1838.46	20.9
100	1824.20	1.74	20	1835.23	33.3	300	1836.81	72.0	220	1839.06	14.9
90	1828.47	3.1	10	1835.52	37.0	290	1836.95	71.2	210	1839.94	9.6
80	1830.90	5.1	0	1835.78	41.7	280	1837.09	66.4	200	1841.34	5.6
70	1832.43	8.2	350	1836.01	47.6	270	1837.25	55.6	190	1843.84	3.2
60	1833.40	12.7	340	1836.20	55.6	260	1837.46	43.9	185	1845.50	2.7

* This only applies to the observations marked Σ. Those by M. Otto Struve, with the Pulkova telescope are, of course, retained; as also the highly important joint observation No. 37, which cannot be dispensed with.

(196) Setting out with this latter table as a basis of calculation, I find the following elements:

Excentricity, ...	$e = 0.87952$
Inclination to the plane of projection, ...	$\gamma = 23° 35' 40''$
Position of ascending node, ...	$\Omega = 5° 33'$
Angular distance of Perihelion from Node on the plane of the orbit, or true angle between the lines of Nodes and Apsides,	$\lambda = 313° 45'$
Epoch of Perihelion Passage, ...	$\tau =$ A. D. 1836·43
Periodic time, ...	P = 182·12 years.

and the following formulæ of computation thence resulting:

$$\tan (v - 46° 15') = [0·03791] . \tan (\theta - 5° 33')$$
$$\tan \tfrac{1}{2} u = [9·40293] . \tan \tfrac{1}{2} v.$$
$$1836·43 - t = [9·70408] . \left\{u - [1·70237] . \sin u.\right\}$$

(197) *Comparison of these Formulæ and Elements with the Table of mean observed Epochs, Art.* (191).

t	θc ° ′	$\theta c - \theta o$ ° ′	t	θc ° ′	$\theta c - \theta o$ ° ′	t	θc ° ′	$\theta c - \theta o$ ° ′
1781.89	131 0	+ 0 16	1832.32	70 8	− 0 26	1838.31	234 12	+ 0 50
1803.20	121 2	+ 1 47	1833.27	60 10	− 1 52	1839.36	216 24	+ 0 31
1822.25	104 52	+ 1 28	1834.34	44 24	+ 0 5	1840.41	206 4	+ 0 22
1825.32	99 6	+ 2 13	1835.25	20 26	+ 2 13	1841.34	199 50	− 0 17
1828.35	90 57	+ 0 27	1836.31	333 27	−16 31	1842.41	194 33	− 0 26
1829.22	87 55	+ 0 12	1836.41	325 40	− 7 44	1843.33	190 55	− 0 42
1830.44	82 24	+ 0 29	1837.30	269 6	+ 1 41	1845.34	185 24	− 0 8
1831.35	77 13	− 0 33						

(198) *Comparison of the same Elements and Formulæ with the Table of interpolated Epochs.*

θ °	$\theta c - \theta o$ ° ′	θ °	$\theta c - \theta o$ ° ′	θ °	$\theta c - \theta o$ ° ′	θ °	$\theta c - \theta o$ ° ′
130	+0 34	50	−0 40	330	−4 8	250	+1 7
120	+1 47	40	+0 29	320	−4 9	240	+0 55
110	+1 59	30	+1 7	310	−4 7	230	+0 59
100	+1 18	20	+1 2	300	−3 22	220	+0 29
90	+0 38	10	+0 28	290	−2 43	210	+0 12
80	−0 6	0	−0 52	280	+0 4	200	−0 9
70	−0 46	350	−2 24	270	+1 33	190	−0 50
60	−1 14	340	−3 30	260	+1 35	185	−0 34

(199) It will not be found easy to represent either the interpolated or the mean observed epochs *throughout* much more closely than by these elements. With regard to the deviation of 16° 31′ in the observed epoch of 1836.31, neither Captain Smyth nor Mr. Dawes are, I believe, disposed to attribute any weight to their observations at that epoch; the stars being then so

excessively close that a doubtful elongation was all the indication of its being actually double afforded by their instruments. The Dorpat angle at the perihelion epoch though stated by M. Struve (*Mensuræ Micrometricæ,* &c. p. 288) to be the result of three days' observations by Messrs. Otto Struve and Sabler, is in fact the mean of two measures of the latter, which, no doubt for valid reasons, he has considered preferable to the others, and indeed the great difference among the individual measures on these three days (which, *allowing for the motion of the stars in the interval*, amounts to fully 12°) clearly shows the difficulty of the observation and the necessity of exercising some judgment in giving a preference to some one result over the other. Now one of M. Sabler's observations thus preferred gives 329° 42′ for the position at the epoch 1836.41, differing only by 4° 2′ from our computation. The other discordances are not greater than may very reasonably be looked for in the present and past state of this inquiry, even when dealing with the mean results of several observers: and the chief among them (that of 1825.32) would be reduced to little more than half its amount, had M. Struve's observation at that identical epoch been used in place of that actually employed. On the whole showing, therefore, I think it will be readily admitted that the elliptic hypothesis is very satisfactorily sustained. The apparently systematic alternation of positive and negative errors, each prevailing over considerable arcs of the orbit, might indeed be regarded, in a more advanced state of the subject, as indicative of some disturbing cause of a periodical character, but at present such a conclusion would be quite premature.

(200) The allineation of Bradley and Pound of the two stars of γ with the line joining α and δ Virginis in 1718.10 has not been included among the data of our interpolations, which extend only from 1781 to 1845. It will therefore be interesting to see how nearly our new elements represent this remarkable observation. I have already observed (see note on Art. 191) that the true angle of position resulting from this allineation at the epoch in question is 150° 52′ instead of 160° 52′, as by a mistake of 10° in reading off the angle of position of those two stars, I originally stated it. Now if we calculate the position for that epoch from the elements above given, we find it to be 149° 16′, differing by only 1° 36′ from Bradley's comparison duly corrected for the ocular equation. This is certainly very satisfactory, being within the limits of what we must even now call good micrometrical measurement. The error of the position concluded from the places of the two stars in Mayer's Catalogue for 1756 is — 5° 26′.

(201) Hitherto no notice has been taken of the apparent distances. They have formed no part of the data from which any of the elements above stated have been computed. The following comparison of the measures taken at different epochs and by different observers with those calculated by the aid of these elements for the respective epochs exhibits a correspondence which, under all the circumstances of the measurements, must be regarded as in the highest degree satisfactory, and as completing beyond all reasonable doubt the evidence in favour of elliptic movement.

t	ρo $''$	ρc $''$	$\rho c - \rho o$ $''$	Authority.	t	ρo $''$	ρc $''$	$\rho c - \rho o$ $''$	Authority.
1781.9	5.63	5.60	−0.03	H. (?)	1833.4	1.18	1.10	−0.08	Sm. Σ.
1803.2	5.91	4.97	−0.94	H. (?)	1834.3	1.07	0.84	−0.13	Sm, h, D, Σ.
1819.4	3.56	3.54	−0.02	Σ.	1835.4	0.51	0.64	+0.13	Σ, Sm.
1822.2	3.32	3.19	−0.13	Σ, Sh.	1836.4	0.26	0.50	+0.24	Σ, (?)
1823.2	3.30	3.04	−0.26	Amici.	1837.4	0.60	0.57	−0.03	Σ, E, M.
1825.3	2.81	2.74	−0.07	Σ, S.	1838.4	0.83	0.86	+0.03	Sm, O, M.
1828.4	2.07	2.21	+0.14	Σ.	1839.4	1.00	1.02	+0.02	Sm.
1829.3	1.79	2.05	+0.26	Σ, h.	1840.4	1.28	1.37	+0.09	O, D.
1830.4	1.90	1.82	−0.08	B, h.	1841.3	1.65	1.61	−0.04	D, M.
1831.3	1.77	1.62	−0.15	D, h, Σ, Sm.	1842.4	1.72	1.86	+0.14	A, D.
1832.4	1.23	1.37	+0.14	D, h, Σ, Sm.	1843.3	1.90	2.06	+0.16	Sm.

In this table ρo denotes the observed and ρc the calculated apparent distance or radius vestor of the ellipse. The observations of 1781 and 1803, as well as that of 1836, at the epoch of the perihelion passage, are founded on estimation of diameters, and are therefore necessarily liable to greater error than the others, which all rely on micrometrical measures. In particular, the estimate of 1803 is certainly much too large. That of 1836 is doubtless an under estimate, owing to the peculiar and difficult circumstances of the observation of which an account may be seen in M. Struve's great work (*Mensuræ Micrometricæ*, &c.) The other errors are all within the limits which the different micrometers, and, above all, the different habits of observers in clipping the stars more or less closely, &c., have hitherto (unfortunately) been found to admit as easily possible, and which render it, in my opinion, impossible to employ the measurements of distance hitherto recorded, as safe elements of calculation. The semi-axis of the real orbit which these comparisons suppose is $9''.69$.*

* Since the greater part of these calculations were made, I have received, through the kindness of M. Maedler, the following series of observed epochs: 1841·355, Pos 200° 6′; 1842·361, 196° 11′; 1843·349, 192° 9′; 1844·356, 188° 55′; 1845·367, 186° 57′. These epochs have not been included in our interpolation, and cannot therefore be fairly compared with its results. When projected separately, they exhibit *a systematic and regularly-increasing deviation* from the projection of Mr. Dawes' and Captain Smyth's observations, of the very same nature as that which compelled me to abstain from including among our normal data the Dorpat observations from 1828 to 1834. Facts of this kind go to prove that full confidence cannot yet be placed in *any* micrometrical measures, even of position angles, and in the case of easy stars (as this is once more become); and they lead us to insist on the necessity of an immense accumulation of measures from a variety of observers, and unremittingly continued for a long series of years, as the only ground of hope for the attainment of *accurate* elements of this or any other double star. This communication is accompanied by a set of elements—(the fourth now calculated by this indefatigable astronomer)—placing the perihelion epoch at 1836·29, and assigning a period of 148·78 years. Comparing the orbits which seem entitled to most reliance, it appears certain that the excentricity lies between 0·855 and 0·880, the inclination between 23° and 27°, the perihelion epoch between 1836·20 and 1836·45, and the period between 140 and 190 years. The best defined element is that which is usually, but absurdly, called the place of the perihelion on the orbit (or $\Omega + \lambda$ in the notation of Art. 192), which cannot differ above a degree one way or the other from 319° 20′. This language ought to be reformed, and the element itself disused, by general consent among astronomers, as a source of endless misapprehension and mistake.

(202) κ Centauri. R A. $13^h\ 42^m$, N P D. 122° 9′. In obs. 1729 (Equatorial Measures) this star was measured at the moment when close to and almost in contact with Halley's comet. On the measured distance I can place no reliance, but the position is good and agrees within 0° 42′ with the mean result of all the equatorial measures, and within 0° 29′ of the twenty-feet position corrected for bias. No argument in favour of any refraction in the atmosphere of the comet can be drawn from the measures in question.

(203) α Centauri. This superb double star, beyond all comparison the most striking object of the kind in the heavens, and to which the discovery of its parallax by the late Professor Henderson has given a degree of astronomical importance no less conspicuous—consists of two individuals, both of a high ruddy or orange colour, though that of the smaller is of a somewhat more sombre and brownish cast. They constitute together a star which to the naked eye is equal or somewhat superior to Arcturus in lustre. Individually *their magnitudes have been very differently estimated by* other observers from what I consider to be the correct values. All agree indeed in assigning the first magnitude to the principal star, or that which follows in R A, but whereas Lacaille, and after him Fallows, Johnson, Taylor, and Messrs. Dunlop and Rümker, estimate the preceding star as of the fourth magnitude, I have never estimated its magnitude as seen with the equatorial lower than 2.3, and the mean of all the magnitudes assigned to it with that instrument is 1.73 or $1\frac{3}{4}$ by a mean of eleven observations. With the twenty-feet it is stated on the only three occasions on which its magnitudes has been registered as 2, $1\frac{1}{2}$, and 3, but the latter is decidedly an under-estimate, as, on the very numerous occasions in which the star has been viewed in that instrument, my habitual judgment has inclined rather to the first than the second magnitude—and on the whole evidence afforded by my experience, I am disposed to assign to it a magnitude which may be deemed indifferently either a very low first or a very high second. That this judgment is not to be lightly put aside, appears from the following note which I find appended to the 20-feet observation of sweep 578 (April 24, 1835), after its measurement as a double star. "A truly noble object. The image received on a sheet of good thick letter paper" [N.B. It was good *royal superfine drawing paper*. Note added April 25*] "was distinctly seen *behind it;* when the paper was *tripled* it required some attention, but when doubled it was conspicuously visible. *At four feet from the eyepiece,* it showed on the paper, seen in front (by reflected, not transmitted rays), a superb double star. The light was very strong, and the distance might easily have been measured with a pair of compasses could the tube have been kept steady. The ratio of the lights of the two images appeared much more unequal than when viewed through the telescope."

(204) It is not necessary to recur to the hypothesis of variability to account for this difference of estimation. To any one accustomed to the use of large telescopes, as compared with those with which the observations of the astronomers above enumerated were made, the fact must be familiar, that the apparent inequality of two stars seen at once in the same field of view diminishes, as the light of the telescope is greater. With the cause of this phenomenon, which is to be sought, no doubt, in the physiology of vision, we have here no concern, but it ought to be always borne in mind when the comparative magnitudes of stars is under discussion. I may take this opportunity to mention, that advantage may be taken of it in photometric comparisons of bright objects, when it is required to decide which of two, nearly equal, is the brighter. The

* On actual inspection of the paper next morning by daylight.

light of both being weakened by reflexion, more or less oblique, at a glass or metallic surface, degrees of inequality will be rendered evident, in a manner to leave no doubt, which would otherwise escape notice. I have more than once had recourse to this mode of observation in the photometric comparison of nearly equal bright stars, where some degree of uncertainty has remained as to their rank in magnitude. Of course it is necessary that both should be reflected at the same angle—a condition easily satisfied by holding the reflecting surface so that the line joining the reflected images shall be parallel to that joining the direct ones.

(205) The proper motion of this double star is so considerable (amounting, according to Mr. Henderson's determination, to 3″.58 per annum*), that, unless a physical connexion between the individuals be supposed, such that the movement of translation through space be common, the one star would, in the interval since Lacaille's observations, have left the other behind nearly 5′ in arc. This consideration alone suffices to decide us in admitting a binary connexion between them, and it will therefore be interesting to see what evidence observation furnishes of orbitual motion round their centre of gravity. For this, however, the data are somewhat precarious, as we have, until recently, only *catalogued differences* of Right Ascensions and Polar Distances, from which to calculate the angle of position and distance at the epochs of observation. This done, and the results tabulated, together with my own positions and distances, obtained by direct measurement with the equatorial, and Mr. Dunlop's, recorded in his paper on the Southern Double Stars, we have as follows:—

Authority.	Epoch of Observation.	Δ R A. s.	Δ N P D. ″	Pos. ° ′	Dist. ″
Lacaille, ...	1750	−1.70	+16.0	218 44	20.51
Fallows, ...	1822 :	−1.90	+25.0	209 36	28.75
Brisbane, ...	1824 :	−1.74	+18.3	215 25	22.45
Dunlop,†	1825	−1.783	+18.788	213 11	22.45
Johnson, ...	1830	−1.53	+16.3	215 2	19.95
Taylor, ...	1831	−1.77	+18.29	215 58	22.56
Herschel, jun...........	1834.68	......	......	......	17.43
Do.	1834.79	......	......	218 30	....
Do.	1835.86	......	......	219 30	....
Do.	1837.34	......	......	220 42	....
Do.	1837.44	......	......	......	16.12

(206) Mr. Fallows's determinations in this series are open to objection from the decidedly inadequate instrumental means by which they were furnished (a small altitude and azimuth circle). Mr. Taylor's results also rest on so few observations, as to entitle them to little weight. It will be observed that neither here nor in the sub-epochs calculated in the general synopsis of my equatorial measures, is there any distance assigned for the middle epoch, including the observations from 1835.271 to 1836.285 inclusive. The reason is that all the distances in that interval were obtained with the thick wires, and with absolute zeros, and are not

* There is a misprint in Mr. H.'s list of proper motions, Mem. R. A. S. xv. The star is called α Centauri, but it cannot be doubted that α is intended. See Johnson and other authorities.

† The distance in this case is computed from Mr. Dunlop's measured Position and difference of declinations.

therefore entitled to be brought into comparison with the others procured with the spider lines and with cross zeros. Indeed, it is obvious from the results of those measures set down in the general register, *as corrected* by the Table in p. 246 (like all the rest in that register so measured), that the empirical correction so applied is clearly too great for this star, which from the extraordinary brightness of its individual constituents must be held to be an exceptional case. Neither are these measures included in the general epoch.

(207) Though it is obviously impracticable to deduce any elliptic elements from such a series, there are some features which it is impossible not to recognise. There can be no doubt that the distance has gone on steadily decreasing since 1822 at least; and the comparison of the measures least open to objection, leads us to conclude that for the thirteen years previous to 1838, the rate of decrease was $\frac{7}{13}$, or a little more than half a second per annum, which, if continued, will bring on an occultation, or exceedingly close appulse about the year 1867. The small amount of variation in the angle of position, shows that the plane of orbitual motion passes nearly, but not quite through our system, while its actual tendency to increase exemplifies the general law of increase of angular velocity with diminution of distance. Mr. Fallows's distance is probably too great by 3″ or 4″; but in the long interval between 1750 and 1822 (at the former of which epochs the distance must have been on the increase), there is room for a very much greater excursion of the small star towards its apparent aphelion, so that, although we are sure that the major axis of the real orbit *must* materially exceed 24″, it is impossible a present to say *how much* it may exceed that limit. Taking, therefore, the co-efficient of parallax for α Centauri, as determined by Professor Henderson at 1″, it will follow, from what has been said, that the real diameter of the relative orbit of one star about the other cannot be so small as that of the orbit of Saturn about the sun, and exceeds, in all probability, that of the orbit of Uranus.

(208) The plane of the orbit in the case of α Centauri, as in that of 44 Bootis, passing nearly through our system, my method of approximating to the elliptic elements (Mem. Art. Soc. Vol. V.), becomes inapplicable, and for their determination, measures of the distance of the stars from each other can alone be relied on. No subject more worthy of diligent and continued inquiry can possibly be urged on the attention of southern astronomers. I am not aware of any micrometric measures taken since 1838.*

(209) π *Lupi.* R A $14^h\ 54^m$ N P D 136° 23′. The sub-epochs calculated in the Synoptic Catalogue, resting as they do on a sufficient total number and value of measurements, must be held conclusive as to the fact of a considerable retrograde angular movement of this star, amounting to about 2° 6′ per annum. There is but one 20-feet measure of this star, viz. in sweep 695 (1836.263), which (corrected for bias) gives a position of 109° 12′, agreeing well with the equatorial, considering the difficulty of the star.

(210) γ *Lupi.* R A $15^h\ 24^m$ N P D 130° 35′. On account of the closeness and difficulty of this beautiful double star, I have divided the whole series of measures into two sub-epochs.

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* It is impossible not to be struck with the parallel which obtains, in a great many physical peculiarities, between the two double stars α Centauri and 61 Cygni. Both consist of nearly equal stars, which in both are of a colour strongly verging to red. Both have very unusually large proper motions. Both have measurable amounts of parallax, and both are clearly binary systems, of unusually large apparent angular dimensions.

So treated, they afford no evidence of angular motion at all to be relied on. There is but one 20-feet measure of it, which, corrected for bias, gives 95° 24′, agreeing remarkably with the general mean 94° 6′ of the whole equatorial series.

(211) R A $17^h\ 34^m$ N P D 145° 20′. If this star be really double (for I cannot help suspecting an illusion), it must be in a most rapid state of angular change.

(212) ξ. 51. *Libræ.* R A $15^h\ 55^m$ N P D 100° 54′. The general epoch calculated in the Synoptic Catalogue for 1835-40, compared with the mean result of my measures for 1830, given in my first series of micrometrical measures (Nos. 397, 398, 399, 400), afford an angular velocity of this close and difficult double star, which may probably be relied on with some confidence.

Epoch. —	1830·26 — 4 nights' obs. —	Pos =	1°·4	value	(8)
"	1835·40 — 8 "	"	10 ·1	"	(22)
	+5·14		+8°·7		

corresponding to a direct motion of + 1°.69 per annum.

(213) γ *Coronæ Australis.* R A $18^h\ 55^m$ N P D 127° 18′. The epochs calculated in the Synoptic Catalogue leave no shadow of doubt as to the reality of a considerable retrograde orbitual movement of 1°.47 per annum in this beautiful double star. The distance 2″.66 renders it easy of measurement, and the individuals being exactly equal, one of the greatest hinderances to precision in this respect is absent. The 20-feet measures afford no information, one of the only two taken being obviously affected by some mistake, either in reading, or otherwise. In those taken with the equatorial I have the most entire confidence.

(214) ζ *Aquarii.* R A $22^h\ 20^m$ N P D 90° 53′. Respecting the continual retrograde movement of this star, no possibility of doubt is now left. The positions reported in my two former series of "micrometrical measures," compared with those here delivered, stand as follows:—

h. 1st series, general mean, . . .	356° 23′ —	1829·11
Dawes (as reported in 2nd series), . .	356 15 —	1831·54
h. 2nd series, ...	356 12 —	1831·64
Mean of all, ...	356 17 —	1830·76
h. Synoptic Catal. as above, . . .	352 0 —	1836·25
	−4° 17′ —	+5·49

being at the rate of — 0°.783 per annum.

CHAPTER III.

OF ASTROMETRY, OR THE NUMERICAL EXPRESSION OF THE APPARENT MAGNITUDES OF THE STARS.

SECTION I.—OF THE METHOD OF SEQUENCES.

(215) A method of determining with precision the relative magnitudes of the fixed stars, that is to say, of assigning to each at a given epoch, a number expressing on a certain scale the intensity of its light, has long been, and still remains a desideratum in Astronomy. The inquiry is, in fact, beset with many and great difficulties, which have only been partially met by any of the various contrivances which have been devised for the purpose, into any account or criticism of which, however, it is not my intention to enter. Some of these difficulties, indeed, seem altogether insuperable—those, namely, which arise from the diversity of colour in the light of the stars themselves; since it seems hardly possible to assign any precise meaning to the equality or other proportion of total brightness of two stars differing sensibly in colour. In such a case the total impression made on the eye is a complex effect, about which, probably, no two observers would ever agree if numerical precision were insisted on; though, on the other hand, all will admit that even greater differences of colour than the light of any two stars offers, would not prevent a certain approach to agreement of judgment as to the general impression produced on the eye, in at least a great number of cases. No one, for example, hesitates in placing α Lyra above Aldebaran, or Arcturus above Spica, though between Antares and α Crucis, or even between ϵ Ursæ and α Persei, or Pollux and Spica; there would be room for difference of judgment, and different eyes would, probably, always come to opposite conclusions as to the order of precedence. Nothing short of a separate and independent estimation of the total amount of the red, the yellow, and the blue rays in the spectrum of each star would suffice for the resolution of the problem of *Astrometry* in the strictness of its numerical acceptation; and this, the actual state of optical science leaves us destitute even of the means of *attempting*, with the slightest prospect of success. For the present, therefore, and, probably, for a long time to come, so far as stars differing in colour are concerned, we must be content with a somewhat rude and coarse approximation to precision in assigning numerically their places in a photometric scale; and even in the case of stars offering no marked peculiarity of colour, there are so many causes which practically interfere with the application of instrumental methods, such as have from time to time been proposed, and the results afforded by those methods have in many instances proved so strongly at variance with the plain judgment of the unaided eye, that I feel little disposed to make an exception in their favour.

(216) Meanwhile, the requirements of astronomy are urgent and pressing, and make even such an approximation very desirable. I can add little to the arguments advanced on this subject by Sir William Herschel in his papers on the comparative brightness of the fixed stars, published in the Transactions of the Royal Society, beyond the impression produced by the extraordinary phenomena presented by the southern star η Argus (which have been described in the former part of this work), and those of variable stars generally, that no time ought to be lost in endeavouring to establish, by direct and extensive observation, a scale of magnitudes which shall be really applicable, with some reasonable degree of exactness, to the state of the heavens as we find it, so as to serve as a record to future ages—if not of indefeasible accuracy, at least sufficiently correct to ensure the detection of changes such as there is abundant reason to believe a great number of stars have undergone within the period of astronomical history. Nothing, indeed, can be more inconvenient and misleading than to find in our catalogues magnitudes assigned to stars, so far above or below the truth, that a single glance at the heavens suffices to expose the error; as where, for instance, we find θ Scorpii (a star of the second magnitude, or 2.3 at the lowest) rated as of the 5th, or λ of the same constellation, a star between the 1st and 2nd magnitudes, set down as of the 3d; α Columbæ and δ Orionis (the former a star of the 3d magnitude, the latter not much more), as of the 2d, &c.

(217) Without dissuading from the introduction of new, and the improvement of old instrumental contrivances (or *astrometers*) for this purpose, and having myself attempted it, not as I think without some degree of success, as will hereafter be explained, I am yet disposed to rely mainly for the formation of a real scale of magnitudes on comparisons made by the unassisted judgment of the naked eye. The method which I have followed for this purpose, and which, to distinguish it from others which have been or may hereafter be proposed, I shall term the method of Sequences, is in some sort an extension and carrying out of Sir William Herschel's method of naked-eye-comparisons, described in his papers above mentioned, so modified and generalized (possibly with some sacrifice of its rigorous precision, though more so in appearance than in *reality*) as to afford a handle for educing from it a *numerical* scale of values of the magnitudes of the stars compared, which it was not capable of doing in its original form, and as practised by him. In this method, stars visible at one time, and favourably, or rather *not unfavourably* situated for comparison, are arranged in *sequences* by the mere judgment of the unaided eye, and these sequences treated according to a certain peculiar and regular system (to be explained presently), are employed to obtain in one unbroken series, a graduating scale of steps, from the brightest down to the faintest stars visible to the eye. Numerical values are then subsequently assigned, and, as the scale in this case is entirely arbitrary, and no photometric relations but those of *more* and *less bright* are used, these numbers may be so assigned as to conform *on a general average* to any usage or nomenclature which may be fixed upon or taken as the general average of astronomers. Waving all discussion of the greater or less propriety of the magnitudes assigned by this or that observer, I have thought it best, on the whole, to adopt as my standard of astrometrical nomenclature, the catalogue of the Astronomical Society of 2881 stars published in 1827, being well aware that the magnitudes there assigned are those of different epochs and of different observers (but all of eminence), and that in individual cases many and considerable errors exist. The mode in which I have eliminated those errors, and secured a true coincidence between the results of my observations and the magnitudes in the catalogue in question, *taken as*

a whole, will be explained in due course, and will, I believe, be found quite free from objection.

(218) In Sir William Herschel's catalogues of comparative brightness, his object was sufficiently attained by so identifying, as it may be termed, the lustre of each star as to enable a future observer to satisfy himself whether or no a change had taken place, and to this end each star was compared with one, or at most, two others judged to be either exactly equal to it, or as little as possible unequal, so as to establish a system of binary or ternary sequences or equalities. And it is clear that this being done (as it was done by him), for each visible star, no change of magnitude could take place without being detected. But for the purpose of establishing an unbroken chain of gradation from the brightest to the faintest visible star, it would be requisite that these sequences should run together, by the last in one always becoming the first of another; and *that* in such a way that many extensive sequences should have several stars in common throughout their entire scale—a condition neither attained nor attempted to be attained in those observations. For the purpose proposed by myself, however, it was necessary to establish much more extended sequences, in each of which at least a considerable interval of the scale of magnitude should be embraced. And having accumulated by sufficiently continued and extensive observation many such sequences, it was further necessary to secure means of combining them into general sequences, including *all* the stars observed.

(219) The process therefore which I pursued was, in general, the following. Choosing *perfectly* clear nights (which for this purpose are quite indispensable), a succession of stars was picked out by actual inspection of the heavens from the largest above the horizon down to some of considerably inferior magnitude, and noted down in a list, in a vertical column—leaving blank intervals more or less considerable, according as the steps of the skeleton scale so picked out were wider or closer—but taking care that between the skeleton stars arranged *seriatim*, there should always be an unequivocal descending step of apparent lustre. The business of the night then was to fill in as far as practicable the steps of this scale into an unbroken chain of downward gradation, placing each newly added star by actual judgment and comparison with its immediate neighbours, in its proper order, until the scale became so gradual in its declension that it was no longer possible to insert fresh stars with certainty *between* its members, in which case they were set down as *equal* to some of those already noted down.

(220) Sir William Herschel's comparisons were instituted between stars at the same, or nearly the same altitude, and in each other's immediate vicinity. In mine, these conditions could not be complied with. Care, however, was taken to avoid low altitudes, and the exceeding purity of the atmosphere of the Cape allowed a range of 60 or even 70 degrees from the zenith in all directions, with little or no fear of being materially misled. The neighbourhood of the moon was avoided, but every night in the absence of the moon being precious for the observation of nebulæ, it was not practicable to avoid moonlight nights for the comparisons, as would, doubtless, have been desirable. It was my earnest wish to have carried on these comparisons during the whole of our homeward voyage (the observations being easily made on ship-board), so as to interweave in sequences sufficiently numerous and extensive, at least all the most conspicuous stars of both hemispheres: but in this I was disappointed, at least to that extent; as a totally overcast state of the sky prevailed from the day of our departure from Table Bay until

we reached nearly the latitude of St. Helena, with the exception of a single fine night on the Equator, on the 28th of March, 1838, advantage of which was taken to procure a short sequence, and several valuable comparisons of southern stars with stars of equal or nearly equal lustre in good situations for European observation. But, with this exception, no other available opportunity occurred till the 14th and 15th of April, when two sequences were observed in lat. 17° and 18° north, but in these the more southern stars were already too low for fair comparison.

(221) The sequences observed at the Cape, and during the voyage home, are given at length. For their better understanding, and to avoid mistakes, it is necessary to mention that the charts referred to during the observations, were either those of Bode's Atlas, or working copies of them formed by pricking off the stars, carefully lettering them to correspond with the originals; outlining the constellations precisely as in Bode, and breaking them afterwards up into triangles, by drawing lines from the large stars (chosen as the most conspicuous, not by the maps, but by actual inspection of the heavens), with a view to the insertion within such triangles of every star visible to the naked eye, and of those only. In consequence, the nomenclature used was necessarily Bode's, with all its faults and mistakes (and they are not a few*). The latter have been carefully rectified: the former I was compelled to tolerate at the time, and throughout much of the subsequent discussion of the observation; no systematic reformation of sidereal nomenclature having then been attempted, like that which has been carried out by Mr. Baily in the catalogue of the British Association. On the publication of that catalogue, however, it became a serious matter of consideration whether to alter the names by which the stars are called in the observed sequences to correspond throughout with that catalogue, or no. To have done so would have been to cut off the connexion of the printed sequences, not only with the original observations, but with a great mass of manuscript work intervening between them and the concluded magnitudes, in all which the nomenclature of Bode had been used, and which to have altered throughout in correspondence, would have infallibly entailed a multitude of errors, and ultimately involved the whole in confusion. I the less regret having been obliged to come to this decision, because I have already recorded my conviction that for this especial purpose an entire remodelling of the whole system of constellations, both northern and southern, is necessary. And I take this opportunity once more to express that conviction, and the hope that another decade will not be allowed to pass over without the accomplishment of so useful a work, without which the progress of this department of astronomy will, of necessity, be slow and uncertain.

(222) There is one constellation, however, in which it was found imperatively necessary to revise with the greatest care the original nomenclature,—viz. Argo—the distinction into compartments independently lettered being indicated by no clear lines of demarkation in Bode's chart, and it having therefore been necessary in observing to adopt a temporary division and nomenclature for the purpose of avoiding the unutterable confusion of Greek, Roman, and

* Still I must render grateful tribute to the valuable aid actually afforded me by these charts, which are, in fact, the only ones in which the smaller southern circumpolar stars are laid down (or at least were so at the time I used them) on the stereographic projection, which is indispensable for the purpose in question.

Italic alphabets there prevalent. In this constellation, then, I have gladly availed myself of the fixation of the lettering of the several subdivisions Vela, Carina, Puppis, and Malus, afforded by the labours of Mr. Baily, and have scrupulously conformed the lettering of my sequences to his nomenclature, in every instance identifying the stars with the utmost care. In so doing, Bode's constellation Pyxis has been abandoned. So, also, in his interpolated constellations of Nubecula Major, and Machina Typographica, in each of which only one star, and in Hell's constellation of "Harpa," in which only two are included in the sequences (and where, therefore, it could be safely as well as easily done), the names or numbers in the British Association Catalogue are substituted for Bode's.

(223) In the names of Bode's constellations, for brevity, the following changes or contractions have been habitually made in constructing the sequences:—

Tubus is used for Telescopium; Fornax, for Apparatus Chemicus; Machina, for Machina Electrica; Sculptor, for Apparatus Sculptoris; Pictor, for Equuleus, or Pluteum Pictoris; Volans, for Piscis Volans; Mensa, for Mons Mensæ; Musca, for Apis (to avoid confusion with Apus).

(224) To obviate the possibility of mistake or doubt in particular cases, the following rules are to be borne in mind in reading the sequences here recorded.

1st. The constellations and letters are those of Bode's maps, except where the contrary is expressly stated, either in what is said above, or in the appended notes.

2nd. Whenever on reference to the catalogue of the British Association it has been ascertained that a difference in either of those respects subsists between these nomenclatures, the star is identified by attaching to it Flamsteed's number (if any), as given in that catalogue, or by stating in a note the number of the star in the catalogue itself. As such reference has been actually made in every case where there has been the least reason to suppose a discordance would exist, I presume that among the lettered stars in the sequences, hardly one will be found unidentified.

3d. A great number of stars have been observed and included in the sequences which occur in Bode's map, without letters. There is scarcely a single instance in which such stars have failed to be identified with stars in the British Association Catalogue (B A C), in Lacaille's Cœlum Australe Stelliferum (L), or in the Histoire Celeste (H C); the last two catalogues as reduced and published by the British Association, or speedily about to be so published. In these cases, as no nomenclature was in question, since the stars must necessarily be cited by number, the numbers adopted are those of the catalogues above mentioned, with their initials annexed. By far the great majority carry the initials B A C.

4th. Besides these, a great many stars have been observed which do not occur in any maps or catalogues. These have been at the time inserted in the skeleton triangles by configurations with neighbouring stars, and they are designated in the sequences by their Right Ascensions and N. P. distances for 1801 (the epoch of Bode), as transferred graphically to his charts, and therefore as affected with the local errors of the charts (which in some parts are very considerable). They are, however, for the most part insignificant stars, not exceeding the 6th magnitude, on which it did not seem worth while to bestow any further pains.

(225) The following marks also require explanation:—When two or more stars are

bracketed together without the sign =, a perceptible, but very trifling difference of brightness is indicated, the upper being the brighter. But when the sign = is added, a perfect equality is meant, and it is indifferent which order they are placed in.

The sign + placed after the number of a catalogued star (thus B 2686 +) indicates that the star in question with either the next to it in the catalogue (B 2687), or some one very nearly adjacent, form a coarse double star, seen by the naked eye as one star, or at least not discriminated as two at the moment of observation, though, perhaps, longer or closer inspection would have shown them separate.

Numbers are annexed after the names of the stars in all the sequences, which occur above the double dotted lines. For the meaning of these numbers, and the explanation of those dotted lines, see Art. 252.

Sequences and Equalities in the Apparent Magnitudes of Stars, observed at Feldhausen, from July 16, 1835, to February 25, 1838, and on board the H. E. I. C. S. Windsor, at sea, from March 28, to April 15, 1838, inclusive.

Sequence 1.

July 16, 1835.

1	Antares		1.27
2	λ Scorpii		1.78
3	θ Scorpii		2.28
4	ε Scorpii		2.78
5	δ Scorpii	=	2.86
6	κ Scorpii		2.86
7	β Scorpii		2.98
8	υ Scorpii	=	3.37
9	π Scorpii		3.37
10	ι Scorpii		3.45
11	σ Scorpii	=	3.45
12	τ Scorpii		3.45
....			
13	γ Tubi		3.62
14	η Scorpii		3.80
....			
....			
15	μ 1 Scorpii		3.98
16	μ 2 Scorpii		4.16
17	ζ 2 Scorpii		4.34
18	ρ Scorpii		4.42
19	ω 1 Scorpii		4.50
20	ν Scorpii		4.58
21	α Normæ		4.67
22	β Normæ		4.68
23	i Scorpii.		
24	ω (Clust). Scorpii.		
25	ω 2 Scorpii.		
26	g Ophiuchi.		
27	ω Ophiuchi.		
28	d Scorpii.		
29	c 2 Scorpii.		
30	χ Scorpii.		
31	ϕ Ophiuchi.		
32	o Ophiuchi.		
33	ψ Scorpii.		

Note.—The order of the chief stars in Scorpio as stated in my paper on the revision of the Southern Constellations, Mem. R. Ast. Soc. xii. p. 215, is, by an unfortunate misprint, thus stated, α, δ, θ, ε. For δ read λ.

Sequence 2.

July 17, 1835.

1	ε Sagittarii	=	2.27
2	θ Scorpii		2.27
3	σ Sagittarii	=	2.58
4	ε Scorpii		2.58
5	ζ Sagittarii	=	2.79
6	κ Scorpii		2.79
7	δ Sagittarii		2.99
8	λ Sagittarii		3.13
9	π Sagittarii		3.27
10	α Aræ		3.40
....			
11	β Aræ		3.50
12	γ Sagittarii		3.61
13	ϕ Sagittarii		3.71
14	β Tubi		3.82
15	γ Tubi	=	3.82
16	γ Aræ		3.82
....			
....			
17	τ Sagittarii.		
18	ξ^2 Sagittarii.		
19	α Tubi.		
20	o Sagittarii.		
21	β 1 Sagittarii.		
22	α Sagittarii.		
23	β Coron. Aus.		
24	α Coron. Aus.	=	
25	γ Coron. Aus.		
26	ρ Sagittarii.		
27	E Sagittarii.		
28	δ Coron. Aust.		
29	ζ Coron. Aust.		
30	β 2 Sagittarii.		
31	K 1 Sagittarii.		
32	υ Sagittarii.		
33	b (terebelli)	=	
34	c (terebelli)		
35	ω Sagittarii		
36	d Sagittarii.		
37	G Sagittarii.		
38	H Sagittarii.		
39	ε Coron. Aus.		
40	ι Coron. Aus.		

Sequence 3.

August 15, 1835.

1	α Eridani	0.93
2	α Gruis	1.67
3	β Gruis	2.36
4	α Phœnicis	2.64
5	γ Gruis	2.92
6	β Hydri	3.19
7	α Hydri	3.26
8	ε Gruis	3.33
9	α Toucani	3.40
10	ι Gruis	3.47
11	β Phœnicis	3.54
12	γ Phœnicis	3.61
13	ϕ Eridani	3.68
14	γ Hydri	3.75
15	β Toucani	3.81
16	χ Eridani	3.86
17	δ Phœnicis	3.92
18	ε Phœnicis	3.97
19	ζ Phœnicis	4.03
20	κ Phœnicis	4.08
21	κ Eridani	4.14
22	ζ Gruis	4.19
23	θ Gruis	4.25
24	δ 1 Gruis	4.30
25	δ 2 Gruis	4.36
26	ε Hydri	4.42
27	δ Hydri	4.48
28	η Phœnicis	4.55
29	ζ Toucani	4.62
30	ι Pisc. Aust.	4.69
31	ι Phœnicis	4.75
32	θ Phœnicis	4.82
33	λ Gruis	4.89
34	ε Toucani	4.96
35	ζ Hydri	5.02
....		
36	ϕ Phœnicis	5.02
37	H Eridani	5.02
38	μ Phœnicis	5.02
39	λ Phœnicis	5.02
40	η Toucani	5.02
....		
....		
41	μ Gruis.	
42	η Gruis.	
43	ρ Gruis.	
44	η Hydri.	

Note.—No. 9 is α Toucani, observed by mistake for γ, by which name the star is erroneously called in the original sequence. No. 5 is called γ Gruis, but cannot be that star.

Sequence 4.

February 11, 1836.

1	Canopus		0.22
2	α Centauri		0.34
3	Arcturus		0.45
4	β Centauri		1.14
5	α Crucis	}	1.21
6	Spica	}	1.27
7	Antares		1.39
8	η Argûs		—
9	β Crucis		1.57
10	γ Leonis		2.42

Sequence 5.

February 15, 1836.

1	Sirius		0.10
2	Canopus		0.22
3	α Centauri		0.34
4	β Centauri		1.14
5	Spica		1.21
6	α Crucis		1.39
7	β Crucis		1.57
8	γ Crucis		1.72
9	β Argûs	=	2.06
10	γ Argûs		2.06
11	ε Argûs		2.17
12	α Trianguli		2.23
13	δ Argûs		2.44

14	θ Centauri		2.55
15	γ Centauri	} =	2.72
16	ι Argûs		2.72
17	ζ Argûs		2.74
18	α Lupi	} =	2.80
19	ε Centauri		2.83
20	β Lupi		2.90
21	ζ Centauri	} =	2.96
22	δ Centauri		2.96
23	κ Argûs		2.96
24	η Centauri		2.96
25	κ Centauri		3.24
26	γ Lupi		3.30
27	ι Centauri		3.40

NOTES.—On this night, η Argûs was placed above but nearly equal to β Crucis.—No. 12, α Trianguli, too near the horizon for a good comparison.

SEQUENCE 6.

February 18—March 6, 1836.

1	Sirius		0.10
2	Canopus		0.22
3	α Centauri		0.34
4	α Eridani		0.61
5	Arcturus		0.88
6	β Centauri		1.14
7	α Crucis		1.21
8	Spica		1.27
9	Antares		1.39
10	Regulus	} =	1.57
11	η Argûs		....
12	β Crucis		1.62
13	γ Crucis		1.72
14	β Argûs		2.01
15	γ Argûs		2.11
16	ε Argûs		2.17
17	λ Scorpii		2.20
18	α Trianguli		2.23
19	γ Centauri		2.27
20	λ Argus	} =	2.32
21	θ Scorpii		2.37
22	δ Argûs	} =	2.44
23	θ Centauri		2.55
24	ι Argûs	}	2.73
25	ζ Argûs		2.74
26	α Lupi	}	2.80
27	ε Centauri		2.83
28	δ Centauri	}	2.92
29	η Centauri		2.93
30	ζ Centauri		2.94
31	κ Argûs	}	3.04
32	β Hydri		3.08
33	μ Argûs	}	3.13
34	β Lupi		3.21
35	ι Centauri		3.22
36	β Trianguli	}	3.30
37	α Muscæ		3.35
38	γ Lupi		3.38
39	θ Argûs		3.42
40	κ Centauri		3.47
41	γ Trianguli		3.52
42	τ Argûs		3.55
43	δ Crucis		3.58
44	β Muscæ	}	3.63
45	υ Argûs		3.66
46	N Velorum	}	3.70
47	α Circini		3.72
48	γ Hydri		3.75
49	α Doradûs		3.78
50	ω Argûs		3.80
51	α Pictoris		3.82
52	λ Centauri		3.84
53	p Carinæ		3.85
54	q Carinæ		3.86
55	α Reticuli		3.87
56	μ Centauri		3.92
57	ν Centauri		3.93
58	χ Argûs		4.03
59	l Carinæ		4.13
60	ι Lupi		4.23
61	φ Argûs		4.32
62	β Reticuli		4.39
63	ζ Lupi		4.44
64	ε Crucis		4.60
65	φ Centauri		4.62

....

66 a Carinæ.
67 δ Muscæ.
68 3984 B A C.
69 γ Volantis.

NOTES.—No 46 is 3269 B A C.—No. 53 is 3619 B A C erroneously marked with the letter e in Bode's Atlas.—No. 54 is 3526 B A C.—No. 59 is 3353 B A C.—No. 60 is 4734 B A C, erroneously included by Bode in the constellation of the Centaur.—No. 66 is 3149 B A C.

The following stars are classed in groups of *nearly* the same magnitudes in each group, all inferior to the foregoing, and each group (generally speaking) consisting of stars larger than those of the groups below it.

SEQUENCE 6.

1st Group of Unarranged Stars.

1 β Chamæleontis.
2 β Apodis.
3 u Carinæ.
4 ζ Volantis.
5 α Volantis.
6 β Volantis.
7 o Carinæ.
8 I Carinæ.
9 υ 2 Centauri.
10 γ Muscæ.
11 ϱ Centauri.
12 O Crucis (Bode).
13 σ Centauri.
14 γ Apodis.

NOTES.—No. 3 is marked κ by mistake in Bode's map.—No. 12 seems to be the pair of stars or coarse double star Nos. 4325 + 4327 B A C, seen as one star.—No. 7, o Carinæ, Bode = 3441 B A C?

SEQUENCE 6.

2nd Group of Unarranged Stars.

1 χ Centauri.
2 δ Trianguli.
3 ε Volantis.
4 c Carinæ.
5 i Carinæ.
6 h Carinæ.
7 υ 1 Centauri.
8 h Centauri.
9 i Centauri.
10 k Centauri.
11 s Carinæ.
12 δ Volantis.
13 δ Chamæl. } =
14 γ Chamæl.
15 δ Doradûs.
16 V Centauri. } =
17 π Centauri.
18 α Apodis.
19 a Velorum. } =
20 b Velorum.
21 c Velorum.

NOTES.—s Carinæ is Bode's S Roboris.—V is Bode's letter in Centaurus for 4735 B A C.—c Velorum is equal to c Carinæ, and greater than either a or b Velorum.

SEQUENCE 6.

3rd Group of Unarranged Stars.

1 λ Crucis.
2 κ Crucis (clust).
3 ζ Crucis.
4 η Crucis.
5 δ Apodis.
6 ε Trianguli.
7 τ Centauri.
8 β Circini.
9 γ Circini.
10 * Volantis = B A C. 2835 + 2837.
11 d Carinæ.
12 B A C. 3986.
13 X Velorum.
14 A Centauri (Bode).
15 g Carinæ.
16 ε Muscæ.
17 B A C. 4461.
18 B A C. 4412.
19 * Muscæ = B A C. 4469 + 4475.
20 B A C. 5566.
21 σ Lupi.
22 d Velorum.
23 e Velorum.
24 P Puppis.
25 R Puppis.
26 B A C. 2670.
27 B A C. 2642.
28 L 2 Puppis.
29 I Puppis.
30 B A C. 2375.

NOTES.—No. 10, two stars seen as one.—14, called A by Bode, is B A C. 3935.—18 is the second of the stars marked S in Bode's Centaurus.—19 is two stars seen as one.

SEQUENCE 6.

4th Group of Unarranged Stars.

1 θ 1 Crucis.
2 ε Chamæleontis.
3 * $\left\{ \begin{matrix} 9^h\ 30^m \\ 151^\circ\ 49' \end{matrix} \right\}$ (1800).
4 f Carinæ.
5 B A C. 4000.
6 y Carinæ.

7 m Carinæ.
8 T Velorum.
9 B A C. 3636.
10 K Carinæ.
11 D 1 Carinæ.
12 B A C. 1926.
13 M Centauri (Bode).
14 η Muscæ.
15 h 1 Puppis.
16 h 2 Puppis.
17 B A C. 2176.
18 L 1 Puppis.
19 H Puppis.

NOTES.—No. 3 not identifiable.—No. 6 misplaced by Bode in Centaurus, is B A C. 3835.—No. 13, called M Centauri by Bode, is B A C. 4580.—No. 19 is B A C. 2332.

SEQUENCE 6.

5th Group of Unarranged Stars.

1 τ 1 Lupi.
2 τ 2 Lupi.
3 ι Crucis.
4 θ 2 Crucis.
5 θ Volantis.
6 κ Carinæ.
7 B A C. 3923 + 3924.
8 P Velorum.
9 V Velorum.
10 t 2 Carinæ.
11 F Centauri ?
12 B A C. 3706 + 3707.
13 B A C. 4284 ?
14 ζ 2 Muscæ.
15 e Carinæ.
16 B Carinæ.
17 Y Centauri (Bo.)
18 N Centauri (Bo.)
19 R Centauri (Bo.)
20 B A C. 4422.
21 δ Circini.
22 B A C. 4644 ?
23 B A C. 4011.
24 o Argus.
25 A Velorum.
26 f Velorum.
27 g Velorum.
28 H Velorum.
29 K Puppis.
30 Q Puppis.
31 B A C. 2415.
32 S Carinæ.
33 Q Carinæ.
34 R Carinæ.
35 B A C. 2339.

NOTES.—No. 10, t^2 Carinæ is B A C. 3655.—No. 11, F Centauri, is L. 5092.—No. 13, B A C. 4284, is called $4\frac{1}{2}$ m by Lacaille, but 6 m in B A C.—No. 15, query whether B A C. 2920 or 2921, or both seen as one star.—No. 16, both Bode's map and B A C. have two stars marked B Carinæ, viz. B A C. 2259 and 2770. The identity therefore doubtful, I suppose my star to be the former.—Nos. 17, 18, 19, are B A C. 4749, 4616, 4695, but have no letters attached.

SEQUENCE 6.

6th Group of Unarranged Stars.

1 b 1 Carinæ.
2 b 2 Carinæ.
3 L Carinæ.
4 κ Chamæleontis.
5 C Carinæ.
6 B A C. 4117 + 4118.
7 B A C. 3993.
8 B A C. 3706 ?
9 B Velorum.
10 B A C. 2955.
11 B A C. 2963.
12 C Velorum.
13 D Velorum.
14 E Velorum.
15 B. 3098.
16 K 2 Puppis (Bode).
17 Y 1 Puppis.
18 Y 2 Puppis.
19 P Carinæ.

NOTES.—No. 8 may possibly be B A C. 3694.—No. 11 is marked "neb" in B A C., no nebula noticed about it with the naked eye.—No. 16, not lettered in B A C., but the letter K is attached to No. 2753 in that Cat., which is Bode's K 1.

NOTES ON SEQUENCE 6.—ζ 1 Muscæ = B A C. 4161, κ Muscæ = B A C. 4542, M Puppis = B A C. 2426, and G Velorum = B A C. 2873, are not visible to the naked eye. G could barely be seen in a night-glass.

SEQUENCE 7.

March 22, 1836.

1	α Centauri	0.34
2	Rigel	0.76
3	Procyon	0.85
4	α Crucis	= 1.30
5	Spica	= 1.30
6	α Orionis	1.41
7	η Argûs	—

8	Regulus	1.48
9	Pollux	1.51
10	β Crucis	1.57

11	γ Crucis	1.72
12	ε Canis	1.89
13	β Leonis	1.91
14	γ Leonis	1.95
15	Castor	1.97
16	ε Orionis	2.00
17	β Argûs	2.01
18	γ Orionis	2.08
19	ζ Orionis	2.09
20	γ Argus	2.11

21	ε Argus	2.17
22	α Trianguli	2.23
23	δ Orionis	2.30
24	δ Canis	2.34
25	γ Geminorum	2.40
26	θ Centauri	2.45
27	β Canis	2.48
28	κ Orionis	2.52
29	δ Argus	= 2.58
30	α Hydræ	= 2.58

31	γ Corvi	2.70
32	β Corvi	2.80
33	γ Centauri	2.87
34	δ Leonis	2.95
35	γ Virginis	3.05
36	δ Corvi	3.20

NOTE.—The stars in this sequence were first placed together in classes, and the stars in each class *then* arranged in order of apparent brightness. The lines drawn between the stars separate the classes. (This is a bad mode of procedure.)

SEQUENCE 8.

March, 1836.

1 γ Muscæ.
2 δ Muscæ.
3 I Carinæ.

4	α Chamæleontis	4.79
5	γ Apodis	4.82
6	α Apodis	4.85
7	δ Chamæleontis	4.88
8	θ Chamæleontis	4.91

. . . .

9 β Chamæleontis.
10 ε Chamæleontis.

SEQUENCE 9.

March, 1836.

1	β Volantis	4.51
2	ζ Crucis	4.56
3	η Crucis	4.60
4	α Volantis	= 4.65
5	γ Chamæleontis	= 4.65

SEQUENCE 10.

April 25, 1836.

1	θ Centauri	2.55
2	γ Centauri	2.71
3	α Lupi	2.80
4	ε Centauri	2.88
5	η Centauri	2.88
6	ζ Centauri	2.91
7	ι Centauri	3.21
8	β Lupi	3.22
9	γ Lupi	3.38
10	κ Centauri	3.66
11	μ Centauri	3.92
12	ν Centauri	3.93
13	δ Lupi	3.95
14	ε Lupi	4.02
15	ζ Lupi	4.07
16	φ 1 Lupi	4.18
17	ι Lupi *	4.29
18	κ Lupi	4.40
19	π Lupi	4.51
20	φ Centauri	4.62

. . . .

21 υ 1 Centauri.

NOTE. — No. 17 is placed in Bode's map in Centaurus, and lettered ι; but there is another ι Centauri (B A C. 4458). It is entered in B A C. (No. 4734) as ι Lupi. In that Catalogue (as also in Bode's map) there is another ι Lupi, viz., No. 5139. I use ι Lupi to designate No. 4734, as being the more conspicuous of the two iotas, and on account of its proximity to two stars τ 1 and τ 2, which, though placed by Bode in Centaurus, undoubtedly belong to Lupus, the real τ Centauri being near γ.

SEQUENCE 11.

April 26, 1836.

1	θ Centauri	2.55
2	γ Centauri	2.71
3	α Lupi	2.81
4	ε Centauri	2.81
5	η Centauri	2.91
6	β Lupi	3.00
7	ζ Centauri	3.02
8	ι Centauri	3.02
9	γ Lupi	3.38
10	κ Centauri	3.66
11	δ Lupi	3.93
12	μ Centauri	3.93
13	ν Centauri	3.93
14	ζ Lupi	4.00
15	ε Lupi	4.05
16	φ 1 Lupi	4.10
17	η Lupi	4.10
18	μ Lupi	4.27
19	υ 1 Centauri	4.34
20	φ Centauri	4.62
	....	
21	π Lupi	4.67
22	d Centauri	4.70
23	b Centauri	4.73
24	c Centauri	4.75
25	λ Lupi	4.76
26	g Centauri	4.78
27	k Centauri	4.80
28	i Centauri	4.82
29	ψ Centauri	4.84
30	a Centauri	4.86
31	ρ Lupi	4.88
	....	
32	σ Lupi.	
33	θ Lupi.	
	———	
34	h Centauri.	
35	υ 2 Centauri.	
36	τ 2 Lupi.	
37	φ 2 Lupi.	
38	τ Centauri.	
39	o Lupi.	
40	B A C. 5139.	
41	d Lupi.	
42	B A C. 5165.	
43	z Centauri.	
44	B A C. 4744.	
45	τ 1 Lupi.	
46	δ Normæ.	
47	η Normæ.	
48	e Lupi.	
49	y Centauri.	

NOTES.—No. 8. This is the true ι Centauri.—No. 30. B A C. 4759.—No. 36. Misplaced by Bode in Centaurus. See note on No. 17 of Sequence 10. —No. 38. The true τ Centauri.—No. 40. Miscalled ι Lupi in B A C.

SEQUENCE 12.

April 27, 1836.

1	γ Centauri	2.57
2	θ Centauri	2.70
3	α Lupi	2.82
4	ε Centauri	2.82
5	η Centauri	2.91
6	β Lupi	3.02
7	ζ Centauri	3.18
8	ι Centauri	3.18
9	γ Lupi	3.38
	———	
10	κ Centauri	3.66
11	δ Lupi	3.93
12	μ Centauri	3.93
13	ν Centauri	3.93
14	ζ Lupi	4.01
15	ε Lupi	4.05
16	η Lupi	4.10
17	ι Lupi	4.17
	———	
18	φ 1 Lupi	4.25
19	κ Lupi	4.32
20	π Lupi	4.40
21	μ Lupi	4.47
22	υ 1 Centauri	4.55
23	φ Centauri	4.62
	....	
24	λ Lupi.	
25	c Centauri.	

NOTE.—No. 25 is B A C. 4852.

SEQUENCE 13.

May 31, 1836.

Moon one day past the full.
Altitude 10°..20°.

1	Sirius	0.10
2	Canopus	0.22
3	α Centauri	0.34
4	Arcturus	0.45
5	Saturn	——
6	β Centauri	1.14
7	α Crucis	1.21
8	Spica	1.39
	———	
9	η Argûs	——
	———	
10	β Crucis	1.57
11	γ Crucis	1.72
12	β Argûs	2.01
13	γ Argûs	2.11
14	ε Argûs	2.17
15	α Trianguli	2.23
16	δ Argûs	2.44
17	λ Argus	2.48
18	θ Centauri	2.55
19	γ Centauri	2.71
20	ι Argûs	2.73
21	ε Centauri	2.80
22	α Lupi	2.83
23	ζ Centauri	2.88
24	η Centauri	2.91
25	δ Centauri ? ? (clouded)	3.00

NOTES.—No. 9, η Argûs, not entitled to a place in the first class of stars.—β Crucis is less than η Argûs.—α Crucis is but a little greater than Spica.—θ Centauri is to-night decidedly greater than γ.

SEQUENCE 14.

May 31, 1836.

1	α Pavonis (low)	2.55
2	θ Centauri	2.55
3	γ Centauri	2.71
4	ι Argus	2.73
5	ε Centauri	2.80
6	α Lupi	2.83
7	μ Argûs ?	2.86
8	ζ Centauri	2.88
9	η Centauri	2.90
10	γ Corvi	2.91
11	β Corvi	2.93
12	δ Centauri	3.00
13	κ Argûs	3.04
14	ι Centauri	3.08
15	γ Virginis	3.08
16	α Libræ	3.15
17	β Libræ	3.15
18	ε Corvi	3.22
19	δ Corvi	3.25
20	γ Hydræ	3.28
21	δ Crucis	3.31
22	θ Argûs	3.34
23	α Muscæ	3.36
24	β Lupi	3.39
25	γ Lupi ? ? *	3.45
26	υ Argûs	3.50
27	γ Triang.	3.50
28	β Triang.	3.55
29	λ Centauri	3.59
30	N Velorum	3.62
31	ω Argûs	3.66
32	π Hydræ	3.70
33	α Circini	3.75
34	κ Centauri	3.79
35	β Muscæ	3.82
36	δ Lupi	3.85
37	ε Lupi	3.89
38	p Carinæ	3.94
39	q Carinæ	3.99
40	ζ Lupi	4.05
41	μ Centauri	4.09
42	ν Centauri	4.15
43	ε Crucis	4.60
44	δ Muscæ	4.60
45	κ Lupi	4.61
46	B A C. 3984	4.61
47	O Crucis	4.61
48	γ Muscæ	4.62
49	φ Centauri	4.62
	....	

NOTES.—No. 25, the moon too near.

SEQUENCE 15.

June 7, 1836.

1	α Centauri	0.34

2 α Lyræ 0.66

---

3 α Eridani 0.93
4 β Centauri 1.14
5 α Crucis 1.21

---

6 Antares 1.27
7 α Aquilæ 1.33
8 Fomalhaut 1.45

---

9 λ Scorpii .... } = 1.61
10 α Gruis .... } 1.61
11 α Cygni: ; (*low*) 1.95
12 ε Sagittarii 2.23
13 α Trianguli 2.26
14 α Pavonis 2.29
15 θ Scorpii 2.32
16 σ Sagittarii 2.36
17 β Gruis 2.38
18 δ Scorpii 2.86

Sequence 16.

July 14, 1836.

1 Canopus (*low*) 0.22
2 α Centauri 0.34
3 α Eridani 0.93
4 β Centauri 1.14
5 α Aquilæ 1.27
6 Antares 1.33
7 Fomalhaut 1.45
8 α Gruis 1.67
9 λ Scorpii 1.95
10 α Trianguli 2.23

---

11 β Ceti 2.24

---

12 α Andromedæ (*low*) 2.25
13 ε Sagittarii .... } = 2.26
14 α Pavonis .... } 2.26
15 θ Scorpii 2.28
16 β Gruis 2.36
17 σ Sagittarii 2.38
18 ε Pegasi 2.51
19 α Pegasi 2.65
20 β Pegasi 2.78
21 α Phœnicis 2.92
22 γ Pegasi 3.05
23 β Hydri 3.19
24 α Toucani 3.38
25 α Pictoris 3.56
26 γ Gruis 3.65
27 α Indi 3.68
28 γ Hydri 3.75
29 α Doradûs 3.82
30 α Reticuli 3.87
....
31 β Doradus.

Note.—No. 17 low.

Sequence 17.

July 16, 1836.

1 β Hydri 3.19
2 ζ Sagittarii 3.24
3 α Toucani 3.30
4 δ Sagittarii 3.35
5 γ Aquilæ 3.41
6 α Hydri 3.46
7 π Sagittarii 3.52
8 γ Gruis 3.57
9 φ Eridani 3.63
10 γ Hydri 3.68
11 α Indi 3.75
....
12 φ Sagittarii 3.83
13 β Pavonis 3.91
14 ε Gruis 4.00
15 δ Pavonis 4.00
16 β Toucani 4.01
17 ν Octantis 4.11
18 β Indi 4.22
19 ε Pavonis 4.33
20 γ Toucani 4.44
21 β Octantis 4.50
22 ζ Pavonis 4.56
23 γ Pavonis .... } = 4.62
24 δ Toucani .... } 4.62

Sequence 18.

August 7, 1836.

1 α Centauri 0.34
2 α Lyræ (*low*) 0.66
3 α Eridani 0.93
4 α Aquilæ 1.27
5 Antares 1.33

---

6 Fomalhaut 1.45

---

7 β Crucis 1.57
8 α Gruis 1.67
9 λ Scorpii 1.97

---

10 θ Scorpii 2.26
11 ε Sagittarii 2.28
12 α Pavonis 2.33

---

13 σ Sagittarii 2.38

....
14 η Ophiuchi 2.89
15 ζ Ophiuchi 2.97

---

16 δ Sagittarii 2.99

---

17 ζ Sagittarii 3.01
18 γ Aquilæ 3.07
19 λ Sagittarii 3.13
20 ν Ophiuchi 3.26

---

21 π Sagittarii 3.40
....
....
22 ζ Aquilæ 3.45

---

23 η Serpentis 3.51

---

24 θ Aquilæ .... } = 3.57
25 λ Aquilæ .... } 3.57

---

26 δ Aquilæ 3.64
27 π Ophiuchi 3.71
28 φ Sagittarii 3.73
29 τ Sagittarii.
30 ξ 2 Sagittarii.
31 ξ Ophiuchi.

---

32 θ Serpentis.

---

33 β Aquilæ.
34 Aquilæ (1 Fl.)
35 η Aquilæ.
36 ο Sagittarii.

---

37 μ Sagittarii.

---

38 Aquilæ (6 Fl.)
39 i Aquilæ.
40 ρ Sagittarii.
41 Aquilæ (9 Fl.)

---

42 q Scuti (Bode).

---

43 ξ 1 Sagittarii.

Notes.—Nos. 34, 38, 41, are the stars called in Bode's maps, m, l, and k Scuti respectively.—No. 42 (q Scuti) is B A C. 6324.

Sequence 19.

November 12, 1836.

1 α Orionis .... } = 0.88
2 Rigel .... } 0.88
3 Procyon 0.90
4 α Eridani (*low*) 0.93
5 α Crucis 1.07
6 Aldebaran 1.21

---

7 η Argus .... —
8 Pollux (*low*) 1.51
9 ε Canis 1.89
10 γ Orionis 1.92
11 ε Orionis 1.97
12 Castor (*low*) 2.02
13 α Hydræ 2.08
14 ζ Orionis 2.16
15 γ Argûs 2.22
16 δ Canis 2.35
17 β Canis 2.41
18 γ Geminor 2.52

---

19 δ Orionis 2.55
20 κ Orionis 2.66
21 ζ Argûs 2.75
22 α Leporis 2.83
23 η Canis 2.96

---

24 α Columbæ 3.05
25 β Eridani 3.20
26 ρ Argûs 3.32
27 β Leporis 3.42

---

28 ι Orionis 3.58
29 ζ Canis 3.65
30 ο 2 Canis 3.72
....
31 η Orionis.

---

32 γ Canis.

Notes.—Before the commencement of this sequence, Jupiter and Mars were compared as follows:—

1 Jupiter.
2 Sirius.
3 Canopus.
4 α Orionis. } =
5 Mars. }

—No. 26 is miscalled ι in Bode's map. It is 15 Fl. Argûs, and is

called in B A C (No. 2728) ρ Argûs. —γ Canis at 3^h 20^m A M. was of 5th magnitude. Bode sets it down as variable.

Sequence 20.

Nov. 13, 1836.

1	α Orionis	=	0.88
2	Rigel	=	0.88
3	γ Orionis		1.77
4	ε Canis		1.77
5	ε Orionis		1.89
6	ζ Orionis		2.13
7	δ Canis		2.40
8	κ Orionis		2.59
9	β Canis		2.64
10	ζ Argûs		2.67
11	δ Orionis		2.74
12	η Canis		2.84
13	α Leporis		2.99
14	π Argûs		3.10
15	β Canis Minor		3.20
16	ι Orionis		3.30
17	β Leporis		3.41
18	q Orionis		3.51
19	β Columbæ		3.62
20	ζ Canis		3.69
21	ξ Argûs		3.72
22	o 2 Canis		3.76
23	σ Argûs		3.79
24	ν Argûs		3.82
25	ε Leporis		3.85
26	r Orionis		3.89
27	η Orionis	=	3.92
28	μ Leporis	=	3.92
29	z Orionis		3.95
30	ζ Leporis		3.99
31	ν 2 Eridani		4.02
32	λ Orionis		4.05
33	η Leporis		4.09
34	γ Leporis		4.12
35	δ Leporis		4.15
36	μ Eridani		4.19
37	L 2 Puppis		4.22
38	τ Orionis		4.25
39	k Puppis		4.29

....

40 θ Orionis.
41 σ Orionis.
42 λ Eridani.
43 ψ Eridani.
44 π 1 Orionis.

45 κ Leporis. =
46 ι Leporis. =
47 λ Leporis. =
48 π 2 Orionis.

49 ξ Eridani ?
50 c Eridani ?
51 ν Leporis.

Notes. — No. 18 is Flamsteed's 1 Orionis, B A C 1486, there called π 1.—No. 26 is Fl. 3 Orionis, B A C 1495, there called π 3.—No. 29 is Fl. 8 Orionis = B A C. 1514, there called π 5.—No. 44 is Fl. 2 Orionis = B A C. 1491, called π 2; and No. 48 is B A C. 1516, the π 4 of that Catalogue. To prevent confusion, I have adhered to the old lettering. The five π's of the B. A. Catalogue are spread over a space nearly 5° in extent.—Nos. 34, 35. Very nearly equal, but γ a trifle larger. In Bode, δ is a whole magnitude above γ.—No. 37 is B A C. 2392.—No. 39 is erroneously marked κ in Bode's map, where it is called Markeb. It is double, the two being seen as one to the naked eye.—No. 40. The trapezium in the nebula seen as one star. Nos. 49, 50. Hazy.

Sequence 21.

November 26, 1836.

1	Sirius		0.10
2	Canopus		0.22
3	Rigel		0.76
4	α Orionis		0.93
5	α Eridani		1.10
6	Fomalhaut		1.45
7	η Argûs		—
8	α Gruis		1.67
9	ε Canis		1.77
10	ε Orionis		1.89
11	ζ Orionis		1.97
12	α Pavonis		1.99
13	β Argûs		2.01
14	γ Argûs	=	2.13
15	δ Canis	=	2.13
16	β Gruis		2.21
17	ε Argûs	=	2.31
18	γ Orionis	=	2.31
19	α Arietis		2.40
20	δ Argûs		2.44
21	β Ceti		2.51
22	κ Orionis		2.59
23	α Phœnicis		2.62
24	δ Orionis		2.65
25	α Leporis		3.05
26	α Toucani		3.09
27	β Hydri		3.17
28	α Hydri		3.26
29	α Columbæ		3.36
30	τ Argûs		3.50
31	α Indi		3.55
32	γ Hydri		3.60
33	α Pictoris		3.64
34	ζ Canis		3.66
35	ν Argûs		3.68
36	γ Gruis		3.70
37	β Leporis		3.72
38	θ Eridani		3.72
39	β Columbæ		3.73
40	α Doradus		3.78
41	β Phœnicis		3.84
42	γ Phœnicis		3.90
43	φ Eridani		3.94
44	ε Gruis		3.98
45	β Toucani		4.04
46	α Reticuli	=	4.09
47	χ Eridani	=	4.09
48	δ Phœnicis		4.18
49	γ Volantis		4.28
50	κ Eridani		4.33
51	ε Phœnicis		4.36
52	κ Phœnicis		4.40
53	γ Toucani		4.44
54	ι Gruis		4.48
55	β Volantis		4.51
56	β Reticuli		4.52
57	δ Volantis		4.54
58	ε Hydri		4.58
59	δ Hydri		4.60
60	ζ Toucani		4.62
61	α Volantis		4.65
62	β Doradûs		4.67
63	ε Toucani		4.70
64	ζ Volantis		4.73
65	α Chamæl.		4.79
66	ε Volantis		4.84
67	γ Doradûs		4.87
68	δ Doradûs		4.90
69	θ Chamæl.		4.91
70	ζ Hydri		4.92
71	ζ Doradûs		4.93
72	ε Reticuli		4.95
73	ε Doradûs		4.96
74	B A C. 1103		5.00
75	ξ Horologii		5.01
76	B A C. 956		5.03

Sequence 22.

March 10, 1837.

1	Canopus		0.22
2	α Centauri		0.33
3	Arcturus		0.45
4	Antares		0.60
5	Saturn		—
6	α Crucis		1.10
7	β Centauri		1.24
8	Spica		1.39
9	η Argus		—
10	β Crucis		1.57
11	γ Argûs	=	1.92
12	β Argûs	=	1.92
13	γ Crucis		2.30

14 θ Centauri 2.55

15 γ Centauri 2.71

16 γ Corvi } = 2.86
17 ε Centauri 2.86
18 γ Virginis } = 2.95
19 β Corvi 2.95
20 δ Centauri 2.95
21 ζ Centauri 3.04
22 δ Corvi 3.15

23 ε Corvi } = 3.31
24 ν Hydræ 3.31
25 ι Centauri 3.45

26 δ Crucis 3.60

27 ε Crucis } 4.60
28 α Corvi 4.60

. . . .

29 η Corvi

30 ζ Corvi

SEQUENCE 23.

April 9, 1837.

1 γ Crucis 1.72
2 γ Argûs 2.01
3 β Argûs 2.11

4 α Trianguli 2.23

5 γ Centauri 2.71

6 γ Corvi 2.90
7 β Corvi 2.93
8 γ Virginis } = 3.11
9 δ Corvi 3.11

10 ε Corvi 3.31
11 σ Scorpii 3.38
12 τ Scorpii 3.45
13 β Trianguli 3.50
14 γ Trianguli 3.52

15 δ Crucis 3.60
16 ζ Virginis 3.70
17 α Circini 3.80
18 δ Virginis 3.90
19 η Virginis 4.00
20 η Lupi 4.10
21 ξ Hydræ 4.15

22 ε Crucis 4.60

. . . .

23 α Corvi 4.61

24 O Crucis 4.61
25 ρ Centauri 4.63
26 σ Centauri 4.66

27 α Normæ 4.67
28 β Normæ 4.68
29 β Crateris 4.68

30 η Corvi.
31 o Crateris (Bode).

32 ζ Crateris.

33 a Hydræ

34 B A C 4284?
35 H Centauri.
36 r Centauri.

Notes.—No. 21 is called in A S C ξ Hydr. et Crat.—No. 29 is B A C. 3826.—No. 31 is 22339 Hist. Cel.—No. 32 = B A C. 3978.—No. 33 is the well-known double Star 17 Hydræ Fl.—No. 35 is B A C. 4344.—No. 36 = B A C. 4437.—No. 34 identity doubtful. My star is noted in the working chart as about 2^{m} following and 15′ north of the star B A C. 4284, which is correctly placed by Bode.

SEQUENCE 24.

April 9, 1837.

1 γ Argûs 2.01
2 β Argûs 2.11
3 λ Argûs 2.48
4 ζ Argûs 2.74
5 π Argûs 2.96
6 ν Argûs } 3.26
7 τ Argûs 3.55
8 σ Argûs 3.79

SEQUENCE 25.

April 10, 1837.

1 η Argûs —
2 ε Canis 1.89
3 γ Argûs 2.01
4 β Argûs 2.11
5 δ Canis 2.34

6 ζ Argûs 2.74
7 π Argûs 2.90
8 β Corvi } 3.00
9 μ Argûs 3.10
10 ε Corvi 3.31
11 ζ Canis? 3.40
12 α Muscæ } = 3.45
13 γ Virginis 3.45
14 ρ Argûs 3.52
15 β Muscæ 3.60
16 τ Argûs 3.66

17 o 2 Canis 3.70
18 ν Argûs 3.73
19 ξ Argûs 3.77
20 σ Canis } = 3.79
21 σ Argûs 3.79

22 c Puppis 3.91
23 κ Canis 4.04
24 λ Canis 4.16
25 k Puppis 4.29
26 o 1 Canis 4.30
27 a Puppis 4.31

28 v Pictoris (Bode) 4.32

29 * B A C. 2562 4.32
30 a Mali 4.33
31 φ Argûs 4.34
32 Ψ Argûs 4.35

33 p Velorum 4.50
34 q Velorum 4.65
35 b Mali } = 4.81
36 c Mali 4.81

. . . .

37 γ Columbæ } = 4.91
38 κ Columbæ 4.91
39 ω Canis 4.93

40 p Puppis 4.96
41 θ Columbæ 4.98
42 o Puppis.
43 f Puppis.
44 D 1 Canis (Bode).
45 M Velorum.
46 B A C. 3382.

47 m Puppis.
48 B A C. 2560.
49 B A C. 3276.
50 t Velorum.
51 u Velorum.
52 Q Velorum.

53 R Velorum.
54 B A C. 3348.
55 B A C. 3501.
56 B A C. 2214.
57 B A C. 2219.

58 B A C. 3379.
59 h Canis (Bode).
60 B A C. 2565.
61 B A C. 3512.
62 B A C. 3461.
63 y Velorum.

64 t Puppis. }
65 g Puppis (Bode).
66 C Canis (Bode).
67 * not identified.
68 B A C. 2557.
69 B A C. 3396.

Notes.—Nos. 5 and 11 set down in the original as γ and δ, but this is clearly by mistake for δ and ζ.—No. 14, mislettered ι by Bode.—No. 22 = B A C. 2580.—No. 23 is Bodes κ 2 = B A C. 2246; 27 is B A C. 2634; 28 is B A C. 1933, placed in that Cat. in Puppis; 30, 35, 36, are respectively B A C. 2964, 2935, and 3010; 42 is B A C. 2594; 43 is 2523; 44 = 2109; 45 = 3300 B A C; 47 = B A C. 2525; 51 = 3370; 52 = 3472; 53 = 3499; 59 = 2251; 65 = 2252; 66 = 2127 of the same Catalogue.

Sequence 26.

April 10, 1837.

1 Arcturus 0.45
2 Saturn —
3 Antares 1.27
4 Spica 1.39
5 θ Scorpii 2.28
6 θ Centauri } 2.55
7 α Ophiuchi 2.67
8 ζ Centauri 2.80
9 α Lupi } = 2.84
10 δ Scorpii 2.84

10 δ Scorpii 2.86
11 β Scorpii 2.88

12 η Ophiuchi 2.89
13 η Centauri 2.91
14 κ Scorpii 2.93
15 α Serpentis 2.95
16 ζ Ophiuchi 2.97
17 δ Ophiuchi 3.00
18 β Herculis 3.02
19 η Bootis (*low*) 3.04
20 β Libræ 3.06
21 α Libræ .... = 3.16
22 β Lupi 3.16

23 γ Lupi 3.38
24 α Herculis 3.38
25 σ Scorpii 3.38
26 τ Scorpii .... = 3.38
27 π Scorpii 3.38
28 δ Lupi 3.95
29 κ Lupi 3.96
30 κ Ophiuchi 3.97

31 γ Scorpii 3.98
32 μ Serpentis 3.99
33 β Serpentis 4.00
34 ε Ophiuchi 4.01
35 ε Lupi 4.02
....
36 ζ Virginis 4.06

37 d Scorpii 4.10
38 δ Serpentis 4.14
39 o Scorpii (19 Fl.) 4.19
40 z Virginis (109 Fl.) 4.23
41 ε Serpentis 4.27
42 λ Ophiuchi 4.32

43 γ Serpentis 4.36
44 μ Virginis 4.40
45 γ Libræ 4.44
46 ι Virginis 4.48
47 ρ Scorpii 4.52
48 κ Virginis 4.56
49 λ Lupi 4.59

50 λ Virginis .... = 4.63
51 θ Libræ 4.63
51 θ Libræ .... = 4.63
52 ξ Scorpii (Bo.) 4.63

53 α Normæ 4.67
54 β Normæ 4.68
55 ι 1 Libræ ....
56 θ Lupi.
57 ι Ophiuchi.
58 υ Ophiuchi.
59 λ Serpentis.
60 c Libræ (16 Fl.) =
61 e Libræ (48 Fl.)
62 σ Serpentis.

63 δ Libræ.

Notes.—No. 31 is 20 Libræ Fl. = B A C. 4950.—o Scorpii, No. 39, is B A C. 5455.—No. 40, z Virginis = B A C. 4878.—No. 52 is 51 Libræ Fl. = B A C. 5324, a well known double star.—Nos. 60 and 61 are Nos. 4927 and 5290 B A C. None of these stars have letters in the B A Catal.—No. 63, δ Libræ, is only of the 6 or 5″ magnitude, though marked 4 m in Bode and 4½ in B A C.

Sequence 27.

August 4, 1837.

1 α Aquilæ 1.33
2 Fomalhaut 1.45

3 α Gruis 1.67

4 β Gruis 2.36
5 σ Sagittarii 2.38

6 α Pavonis 2.50
7 ε Pegasi 2.62

8 γ Aquilæ 2.73
9 β Aquarii 2.85
10 α Aquarii 2.97
11 α Toucani 3.08
12 δ Capricorni 3.20

13 β Capricorni 3.32
14 γ Gruis 3.44
15 γ Pavonis 3.56

16 α Indi 3.68
....
17 δ Aquarii 3.79
18 ε Gruis 3.88
19 α 2 Capricorni 3.94
20 γ Capricorni 3.98
21 β Pavonis 4.01
22 ζ Aquarii.

23 γ Aquarii.

24 λ Aquarii.
25 η Aquarii.
26 c 2 Aquarii (88 Fl.)
27 β Aquilæ.
28 τ Aquarii.
29 θ Aquarii.
30 η Gruis.
31 b 1 Aquarii (98 Fl.)
32 α 1 Capricorni.

33 ι Aquarii.
34 ε Pisc. Aust.
35 β Pisc. Aust.
36 b 2 Aquarii (99 Fl.)
37 π Aquarii.

38 b 4 Aquarii (101 Fl.)
39 γ Pisc. Aust. (22 Fl.)
40 δ Pisc. Aust. (23 Fl.)
41 μ Pisc. Aust.
42 c 3 Aquarii (89 Fl.)
43 c 1 Aquarii (86 Fl.)
44 o Aquarii (31 Fl.)

45 π Pisc. Aust. (75 Fl.)
46 L Aquarii (61 Fl.)
47 σ Aquarii.
48 ρ Aquarii.
49 υ Pisc. Aust. (Bode).

Notes.—No. 39 is mis-lettered ξ in Bode's map; and No. 40 is there lettered o.—Nos. 45 and 46 have no letters in B A C. Those used here are Bode's.—No. 49 is B A C. 7702. N.B. α 1 and α 2 Capricorni distinctly seen as two stars with the naked eye.

Sequence 28.

September 24, 1837.

1 β Gruis 2.36

2 α Arietis 2.40
3 β Ceti 2.66

4 α Phœnicis 2.92
5 β Hydri 3.19

6 α Ceti 3.46
7 θ Eridani 3.73
....
8 α Hydri 3.83
9 γ Eridani 3.93

10 η Ceti 4.03
11 α Piscium 4.13
12 γ Ceti 4.24
13 τ Ceti 4.28
14 θ Ceti 4.33
15 δ Eridani 4.37
16 υ Ceti + t Ceti 4.42
17 ε Eridani 4.46
18 κ Eridani 4.51
19 α Fornacis (Bode) 4.55
20 s Eridani (Fl. 16) 4.59
21 η Eridani 4.63
22 π Ceti 4.67
23 δ Ceti 4.71
24 t Eridani (19 Fl.) 4.74
25 E Eridani (11 Fl.) 4.78
26 g Eridani 4.81
27 f 2 Eridani 4.85
28 m 1 Eridani (27 Fl.) 4.85
29 ζ Ceti 4.86
30 τ 1 Eridani (1 Fl.) 4.86
31 ε Ceti 4.86
32 ρ Ceti 4.87
33 l 1 Eridani (33 Fl.) 4.88
34 l 2 Eridani (36 Fl.) 4.89
35 h Eridani 4.89
36 Eridani (15 Fl.)
37 σ Ceti.
38 ζ Eridani.
39 χ 2 Ceti (Bode).
40 m 2 Eridani (28 Fl.)
41 c Ceti (46 Fl.)
42 F Eridani (20 Fl.)
43 b Ceti (37 Fl.)
44 τ 2 Eridani (2 Fl.)
45 υ 1 Ceti (56 Fl.)
46 u Ceti (75 Fl.)
47 o Ceti?

Notes.—In this Sequence the lettering is that of Bode's Atlas, Plate XVII. But the stars have been all carefully identified by the aid of the B A C. with Flamsteed's, wherever a difference of lettering arising from the carrying out of Bayer's system in that Catalogue renders a doubt possible. To have changed all the letters would have inevitably induced complete confusion.—No. 14 is θ 1 Ceti Bode, but θ 2 being a distant and inconspicuous star (7 m), the 1 is dropped.—No. 16

near υ is t, but both are here seen as one star.—No. 19. The α of Fornax is retained in B A C. No. 997 with the constellation Eridanus, so that in that Catalogue the star stands as α Eridani. It is 12 Fl. Eridani.—No. 20 is τ 4, No. 24 is τ 5, No. 25 = τ 3, No. 28 = τ 6, 30 = τ 1, 33 = τ 8, 34 = τ 9, 40 = τ 7, and 44 = τ 2, of the B A C.—No. 26 is B A C. 1201, there called υ 2; No. 27 = B A C. 1199; 35 = B A C. 1151, there called υ 1; 36 = B A C. 1031; 39 is simply lettered χ Ceti in B A C.; 41 is B A C. 429; 42 = B A C. 1115; 43 = B A C. 372; 45 = 594; and 46 = 778, of that Catalogue.—In this Sequence, strong suspicions of temporary dimness from flitting haze, and certainly north of the equator there was no deciding with certainty on the magnitudes. Even α, γ, and δ Ceti were occasionally touched. Bode's θ 2 Ceti and his χ 1 Ceti not seen; χ 2 conspicuous, 5 m.

Sequence 29.

September 25, 1837.

1 β Ceti 2.46

2 α Ceti 3.14

....

....

3 η Ceti 4.00
4 τ Ceti 4.28

5 θ Ceti 4.30
6 δ Eridani 4.33
7 ε Eridani 4.40

8 α Sculptoris.
9 υ 2 Ceti.

10 δ Sculptoris.
11 ν 2 Machinæ.

12 ζ Sculptoris.
13 ω Fornacis.

14 φ 1 Ceti (17 Fl.)
15 χ 2 Ceti.
16 β Machinæ.
17 ν 1 Machinæ.
18 π Eridani (26 F.)
19 * Ceti (48 Fl.)
20 * Ceti 4396 H C.

21 υ 1 Ceti (56 F.)
22 α Machinæ.
23 ι Machinæ.
24 F Ceti (67 F.)
25 F Eridani (20 F.)

26 ψ Ceti.
27 t Ceti (57 F.)
28 ψ 2 Machinæ.
29 c Ceti (46 F.)
30 φ 2 Ceti (19 F.)
31 ρ 3 Erid. (10 F.)
32 * Ceti (18 F.)
33 γ 2 Eridani.
34 H C. 6161.

35 B A C. 203.
36 H C. 7422. } =
37 c Eridani. }
38 H C. 4466.
39 ρ 2 Eridani (9 F.)
40 H C. 1245.
41 Ceti (27 F.)
42 H C. 3479.
43 B A C. 776.
44 D Eridani.
45 κ 1 Sculptoris. } =
46 κ 2 Sculptoris. }
47 ψ Sculptoris.
48 ι Sculptoris.
49 μ Ceti (75 F.)
50 B A C. 1152.
51 B Eridani.

52 ψ 1 Machinæ.
53 φ 3 Ceti (22 F.)
54 φ 4 Ceti (23 F.)
55 Ceti (28 F.)
56 Ceti (30 F.)
57 ρ 1 Eridani (8 F.)
58 q Ceti.
59 θ 2 Ceti.
60 χ 1 Ceti.

Notes.—The nomenclature is that of Bode's Chart, Pl. 17 for lettered stars. The identifications with B A C. and the Histoire Celeste are as follows:—

No.	=B A C.	No.	=B A C.
11	643	28	460
12	8352	45	10
13	790	46	23
15	1031	47	135
16	688	48	72
17	627	50	1152
22	541	52	458
23	489	58	230
26	115		

No.	=H C.	No.	=H C.
33	7600	40	1245, 1246
34	6161	44	6535
36	7422, 7423	51	6661
37	7273	59	2848
38	4466, 4467	60	3137

The bracketed numbers are probably only duplicates. Bode's π and θ Fornacis are invisible to the naked eye.

Sequence 30.

Oct. 24, 1837.

1 Canopus 0.22
2 α Orionis (high) 0.50
3 α Eridani 0.80
4 α Orionis (low) 1.07
5 Rigel 1.27

6 Fomalhaut 1.45
7 Aldebaran 1.54
8 α Gruis 1.67

9 α Arietis .... } = 2.40
10 α Pavonis .... } 2.40

11 β Ceti 2.43
12 β Gruis 2.46

13 κ Orionis 2.58
14 α Phœnicis 2.70
15 α Ceti 2.82
16 α Leporis 2.94

17 β Eridani 3.06
18 α Columbæ 3.18
19 β Hydri 3.27
20 α Hydri 3.37
21 β Arietis 3.49

22 α Toucani 3.61
23 θ Eridani 3.73
24 γ Hydri 3.77
25 α Doradus .... } = 3.80
26 α Pictoris .... } 3.80

27 α Reticuli .... } = 3.87
28 γ Gruis .... } 3.94
29 β Phœnicis 4.01
30 ε Gruis 4.05
31 γ Phœnicis 4.10
32 β Toucani 4.15
33 φ Eridani 4.20
34 γ Ceti 4.24
35 δ Hydri .... } = 4.29
36 ε Hydri .... } 4.29
37 χ Eridani 4.33
38 γ Volantis 4.37
39 β Doradûs 4.40
40 γ Toucani 4.43
41 ζ Phœnicis 4.47
42 ε Phœnicis 4.50
43 α Volantis 4.53
44 δ Volantis .... } 4.56
45 β Reticuli .... } 4.58
46 ι Eridani .... } 4.60
47 δ Toucani 4.62
48 κ Eridani 4.65
49 β Volantis 4.68
50 δ Ceti 4.71
51 ζ Volantis 4.73
52 δ Phœnicis .... } 4.75
53 η Phœnicis .... } 4.78
54 κ Phœnicis 4.81
55 γ Doradûs 4.83
56 ε Volantis 4.85
57 α Chamæleontis 4.88
58 ζ Toucani 4.90
59 δ Doradûs 4.92
60 ⊕ Toucani 4.94
61 ε Doradûs 4.96
62 ε Toucani 4.97
63 γ Reticuli 4.98
64 B A C. 1103 .... 4.99
65 λ Phœnicis 4.99
66 η Toucani 5.00
67 ξ Horologii (Bo.) 5.01
68 f 1 Eridani 5.02
69 ζ Hydri 5.02

....

70 B A C. 582.
71 B A C. 604.
72 δ Reticuli.
73 G Carinæ.
74 η Hydri.
75 μ Phœnicis.
76 κ Toucani.

77 ε Reticuli.
78 ρ Phœnicis.
79 ι Reticuli.
80 ν Hydri.
81 ρ Toucani.
82 B A C. 958.
83 β Horologii ? ?
84 B A C. 2835 +
85 η Volantis.
86 υ Toucani.

Notes.—No. 60 is the great cluster B A C. 85, seen as a star; 67 = B A C. 1048 + 1051; 68 is B A C. 828; 83 not identified; 84 is B A C. 2835 + 2837, seen as one star = Bode 16 + 17.

Sequence 31.

Nov. 16, 1837.

1	Fomalhaut		1.47
2	β Gruis	} =	2.36
3	α Arietis		2.40
4	β Ceti		2.46
5	α Ceti		3.14
6	γ Gruis		3.66
7	δ Aquarii		3.80
8	γ 1 Eridani		3.95
9	η Ceti		4.09
10	γ Ceti		4.24
11	δ Eridani		4.26
12	s Eridani (16 F.)		4.28
13	c 2 Aquarii (*low*)		4.30
14	o Tauri		4.32
15	ε Eridani	} =	4.34
16	α Piscium		4.34
17	ξ Tauri		4.36
18	η Eridani		4.38
19	ν Tauri		4.40
20	σ Eridani		4.42
21	Tauri (10 F.)		4.43
22	π Ceti		4.45
23	E Eridani		4.47
24	ξ 2 Ceti		4.49
25	m 1 Eridani		4.51
26	t Eridani		4.53
27	d Eridani		4.55
28	τ 1 Eridani		4.57
29	μ Ceti		4.59
30	l 2 Eridani		4.61
31	p Sceptri (Bo.)		4.62
32	τ 2 Eridani.		
33	ζ Eridani.		
34	l 1 Eridani.		
35	Eridani (17 F.)		
36	χ 2 Ceti.		
37	Pisc. Aust. (19 F.)		

Notes. — Seven of the Pleiades seen with the naked eye and equalized as follows:—

1 η Tauri / δ Eridani } =
2 f Pleiadum / η Eridani } =
3 b Pleiadum / π Eridani } =
4 c Pleiadum / 5 d Pleiadum } =
6 e Pleiadum.
7 h Pleiadum.

They glimmer, however, fully a magnitude + and — c and d are rather less than π Eridani; e rather less than c or d; h barely discernible.—No. 31 is 53 Fl. Eridani = B A C. 1441.

Sequence 32.

December 16, 1837.

1	Sirius		0.10
2	Canopus		0.22
3	η Argûs (*low*)	}	—
4	Rigel		0.76
5	α Eridani		0.93
6	α Orionis		1.00
7	Aldebaran		1.07
8	ε Orionis		1.77
9	ε Canis		1.89
10	β Argûs		1.95
11	ζ Orionis		2.04
12	γ Argûs		2.11
13	δ Canis		2.34
14	γ Orionis		2.42
15	κ Orionis	}	2.59
16	β Canis		2.64
17	ζ Argûs		2.74
18	δ Orionis		2.79
19	η Canis		2.84
20	π Argûs		2.96
21	α Leporis		3.05
22	α Columbæ		3.09
23	β Leporis		3.20
24	ι Orionis		3.30
25	β Columbæ		3.37
26	β Eridani		3.44
27	τ Argûs		3.55
28	σ Argûs		3.79
29	ε Leporis		3.85
30	γ Leporis	}	3.87
31	μ Leporis		3.90
32	ζ Leporis		3.99
33	η Leporis		4.09
34	δ Leporis		4.15

Notes.—On this occasion the great and sudden increase of brightness in η Argûs was first noticed. Bode has two ζ Normæ's, one near ε and θ, and a pair, ζ 1 and ζ 2, near κ, none of them exceed 7 m, heing barely perceptible in an opera-glass.

Sequence 33.

December 28, 1837.

1	Jupiter		—
2	Sirius		0.10
3	Canopus		0.22
4	η Argûs (high)	} =	—
5	α Centauri (low)		0.34
6	Rigel		0.76
7	α Eridani	}	0.85
8	Procyon		0.93
9	β Centauri (low)	}	1.14
10	α Crucis		1.21
11	ε Orionis		1.40
12	β Crucis		1.60
13	ε Canis		1.74
14	γ Crucis		1.86
15	ζ Orionis		1.95
16	β Argûs		2.01
17	γ Argûs		2.10
18	δ Canis		2.16
19	ε Argûs		2.27
20	γ Orionis		2.42
21	κ Orionis		2.59
22	β Canis		2.64
23	ζ Argûs		2.74

Note.—When α Centauri was higher, η Argûs was a little inferior.

Sequence 34.

December 29, 1837.

1	Jupiter		—
2	Sirius		0.10
3	Canopus		0.22
4	α Centauri (10°)	}	0.34
5	η Argûs (40°)		—
6	Rigel		0.76
7	α Eridani		0.85
8	Procyon		0.93
9	α Orionis		1.00
10	Aldebaran		1.07
11	β Centauri	}	1.14
12	α Crucis		1.21
13	Spica		1.39
14	Pollux		1.51
15	β Crucis		1.57
16	Regulus		1.62
17	γ Crucis		1.72

18	ε Orionis	} =	1.88
19	ζ Orionis		1.88
19	ζ Orionis	} =	1.88
20	ε Canis		1.88
21	γ Orionis		1.97
22	γ Argûs		2.04
23	β Argûs		2.10
24	ε Argûs		2.17
25	δ Canis		2.26
26	δ Argûs		2.35
27	α Hydræ		2.41
28	λ Argûs		2.48
29	β Hydri		3.19
30	δ Crucis		3.60
31	ν Centauri	} =	3.92
32	β Doradûs		3.92
33	μ Centauri		3.93
34	φ Centauri		4.30
35	γ Volantis		4.50
36	ζ Volantis		4.60
37	δ Volantis		4.69
38	ρ Lupi		4.72
39	ξ 2 Centauri		4.77
40	f Centauri		4.81
41	δ Doradûs	}	4.85
42	ε Volantis		4.90
43	V Centauri		4.90
44	υ 1 Centauri		4.91
45	ω Centauri ⊕		4.91
46	χ Centauri		4.92
47	d Centauri		4.92
48	? ?		4.92
49	n Centauri		4.93
50	B A C. 2835 +		4.93
51	ν Doradûs		4.94
52	θ Doradûs		4.94
53	γ Pictoris		4.95
54	B Carinæ	} =	4.95
55	C Carinæ		4.95
56	ρ Pictoris		4.96
57	ε Doradûs		4.96

....

58 B A C. 1502.
59 B A C. 1926.
60 σ Centauri.
61 υ 2 Centauri.

62 ι Pictoris ?
63 ξ 1 Centauri.
64 e Centauri.

65 β Mensæ.
67 X Centauri. } =
68 Y Centauri.
69 α Mensæ.
70 γ Mensæ.
71 π 1 Doradûs. } =
72 π 2 Doradûs.
73 B A C. 2333.
74 B A C. 2032.

75 η 1 Doradûs.
76 η 2 Doradûs.
77 ν Pictoris.
78 M Centauri.
79 m Centauri.
80 K Centauri.

81 B A C. 2146.
82 μ Pictoris.
83 B A C. 2108.
84 B A C. 2686 +
85 N Centauri.
86 B A C. 4625 } =
87 B A C. 4635
88 B A C. 4693.
89 * not identified.
90 z Centauri.
91 w Centauri.
92 * not identified.
93 B A C. 4482.
94 Not identified.
95 Not identified.
96 Not identified.
97 Cent. 154 Bode.

98 B A C. 2124?
99 B A C. 2108.
100 B A C. 2408.
101 B A C. 3411 ?
102 B A C. 3435 ?
103 Not identified.
104 B A C. 4704.

Notes.—No. 40 is B A C. 4377.—The stars after No. 64 are merely grouped, but under each group unarranged in any order of brightness.—No. 14. 15 Pollux and β Crucis were not compared together. Both were greater than Regulus and less than Spica.—Nos. 48, 101, 102. These three stars are called φ 1, φ 2, and φ 3, Carinæ. I find no such marks in any of my working charts. I suppose φ 1 must be φ Argus, and that φ 2 is B A C. 3411, and φ 3 = B A C. 3435, near φ.

No.	is B A C.	No.	is B A C.
50	2835, 2837	76	2031
		77	2093
54	2770	78	4580
55	2796	79	4417
56	1993	80	4495
63	4368	82	2167
64	4316	84	2686, 2687
65	1606		
67	4709	85	4616
68	4749	90	4586
69	2053	91	4409
75	2003		

Of the stars not identified, the places for 1800, taken from Bode's map, are as follows:—

No.	R A h.	R A m.	N P D. °	N P D. ′
89	13	49	140	45
92	13	37	138	55
94	12	56	131	40
95	12	59	133	20
96	13	2	133	20
103	7	52	153	0

ι Pictoris (No. 62) is called ι Doradûs in MS.; but as there is no such star in Bode's chart, this must have been a mistake for the star here set down = B A C. 1521.

Sequence 35.

January 2, 1838.

Not a good night.

1	Rigel		0.76
2	Procyon		0.85
3	α Eridani		0.93
4	α Orionis		1.00
5	β Centauri		1.14
6	Pollux		1.18
7	α Crucis	}	1.21
8	β Centauri		1.30
9	β Crucis		1.57
10	Castor		1.67
11	α Hydræ		1.73
12	ε Orionis		1.77
13	ε Canis	} =	1.99
14	γ Orionis		1.99
15	ζ Orionis		1.99
16	β Argûs		1.99
17	γ Argûs		2.14
18	δ Argûs		2.29
19	δ Canis		2.45
20	κ Orionis		2.59
21	β Canis		2.64
22	α Leporis		2.80
23	α Muscæ	}	2.90
24	γ Corvi		—
24	γ Corvi	} =	2.97
25	β Leporis		2.97
26	β Eridani	}	3.06
27	α Columbæ		3.13
28	β Corvi		3.19
29	μ Argûs		3.23
30	δ Corvi		3.27
31	τ Argûs	}	3.36
32	ζ Hydræ		3.44
33	ε Corvi		3.48
34	β Muscæ		3.52
35	δ Crucis		3.62
36	β Canis Minor		3.65
37	ν Hydræ		3.69
38	ε Hydræ	}	3.72
39	α Doradûs		3.75
40	γ Hydri		3.77
41	δ Crateris	}	3.80
42	μ Centauri		3.88
43	ν Centauri		3.97
44	α Reticuli		4.02
45	α Pictoris		4.09
46	λ 2 Hydræ		4.18
47	β Cancri		4.27
48	γ Volantis		4.37
49	β Hydræ		4.46
50	β Reticuli		4.58
51	ε Crucis		4.60

....

52	μ Hydræ		4.61
53	γ Crateris		4.62
54	ι Hydræ		4.63
55	υ 1 Hydræ		4.64
56	α Crateris		4.65
57	δ Hydræ		4.66

58	η Hydræ	4.67
59	β Crateris	4.68
60	α Corvi.	
61	τ 2 Hydræ.	
62	σ Hydræ.	
63	υ 2 Hydræ.	
64	τ 1 Hydræ.	
65	B A C. 4265. } =	
66	B A C. 4221. }	
67	Not identified. } =	
68	Not identified. }	

Notes.—Nos. 5 and 8, *sic in MS.*—No. 18 called ζ; no doubt δ.—The places of the unidentified stars on Bode's chart for 1800 are respectively:

R. A.	N P D.
$12^h\ 24^m$	150° 45′
12 19	150 20

I cannot be quite sure of the entire absence of cloud in the early part of the night, though I think the sky was good.

Sequence 36.

January 6, 1838.

1	Sirius	0.10
2	Canopus	0.22
3	α Centauri	0.34
4	η Argûs	——
5	Rigel	0.76
6	Procyon	0.85
7	α Eridani	0.93
8	α Orionis	1.00
9	Aldebaran ☽	1.07
10	α Crucis	1.21
11	Pollux	1.51
12	β Crucis	1.57
13	γ Crucis	1.72
14	ε Canis	1.77
15	ε Orionis }	1.89
16	ζ Orionis }	1.97
17	β Argûs	2.01
18	γ Argûs } =	2.09
19	γ Orionis ☽ ☽ }	2.09
20	ε Argûs	2.17
21	α Hydræ } =	2.32
22	δ Canis }	2.32
23	δ Argûs	2.44
24	λ Argûs	2.48
25	γ Geminorum	2.50
26	β Canis	2.56
27	κ Orionis	2.60
28	ζ Argûs	2.69
29	η Canis	2.80
30	κ Argûs	2.85
31	π Argûs	2.93
32	ι Argûs	3.00
33	μ Argûs } =	3.08
34	α Leporis }	3.08
35	υ Argûs	3.16
36	ω Argûs	3.25
37	τ Argûs } =	3.36
38	β Leporis }	3.36
39	β Canis Min.	3.49
40	β Eridani	3.55
41	α Hydri } =	3.62
42	β Hydri }	3.62
43	α Pictoris	3.68
44	γ Hydri	3.70
45	ν Argûs	3.73
46	ν Hydræ }	3.76
47	σ Argûs }	3.79
48	α Doradûs	3.82
49	α Reticuli	3.87
50	χ Argûs	3.93
51	ο Argûs	3.99
52	α Carinæ	4.05
53	α Mali }	4.11
54	ι Hydræ }	4.17
55	β Pictoris	4.23
56	γ Volantis	4.28
57	β Volantis	4.51
58	ζ Volantis	4.73
59	b Mali	4.81
60	ε Volantis	4.82
61	α Volantis	4.83
62	a Velorum	4.86
63	b Velorum	4.89
64	q Velorum	4.92
65	B Carinæ	4.95
66	P Puppis	4.95
67	c Velorum	4.95
68	R Puppis	4.95
69	N Carinæ	4.95
70	γ Pictoris	4.95
71	ζ Doradûs.	
72	L 2 Puppis.	
73	I Puppis.	
74	B A C. 2642. }	
75	B A C. 2670. }	
76	B A C. 2955.	
77	d Velorum.	
78	e Velorum.	
79	h 1 Puppis } =	
80	h 2 Puppis }	
81	B Carinæ } =	
82	C Carinæ }	
83	ι Pictoris.	
84	$8^h\ 38^m$, 142° 30′.	
85	g Carinæ } =	
86	f Carinæ }	
87	e 1 Carinæ }	
88	e 2 Carinæ }	
89	H Velorum.	
90	ρ Pictoris.	
91	λ Doradûs.	
92	L 1 Puppis.	
93	B A C. 2332.	
94	B A C. 2404.	
95	D Velorum.	
96	b 1 Carinæ }	
97	b 2 Carinæ }	

Note.—No. 65 is B A C. 2259; No. 81 is B A C. 2770; both are called B Carinæ in B A C, but the latter, being not far from C, is preferably to be so called.

Groups observed in Sequence 36, of magnitudes inferior to the foregoing—the Stars in each Group being unarranged.

Group 1st, 6th Mag.

1	S Carinæ.
2	Q Carinæ.
3	θ Pictoris.
4	V Puppis.
5	Z Puppis.
6	ζ Pictoris.
7	λ Pictoris.
8	f Velorum.
9	g Velorum.
10	B Velorum.
11	B A C. 2336.
12	B A C. 2474.
13	B A C. 1890 } =
14	B A C. 1917 }
15	B A C. 2289 } =
16	B A C. 2328 }
17	B A C. 2375.
18	B A C. 2963.
19	B A C. 3045. } =
20	B A C. 3077. }
21	B A C. 2847. } =
22	B A C. 2733. }
23	B A C. 3081.
24	$7^h\ 16^m$, 141° 40′.
25	8 2 133 50

Group 2. 6.7 Mag.

1	μ Pictoris.
2	η 1 Pictoris. =
3	η 2 Pictoris.
4	G Puppis.
5	Y 1 Puppis. } =
6	Y 2 Puppis. }
7	A Velorum.
8	C Velorum.
9	h Velorum.
10	F Velorum.
11	B A C. 2325.
12	B A C. 2598 } =
13	B A C. 2645 }
14	B A C. 2956.
15	B A C. 3098.
16	$8^h\ 56^m$, 131° 20′.

Group 3. 7 Mag. and Under.

1	E Velorum.
2	K 2 Puppis.
3	φ Pictoris (Bode).

Notes.—The right ascensions and polar distances of the unidentified stars are for 1800, as read off from their places projected on Bode's Chart, No. XX.—K 2 Puppis, the 2nd of Group 3, is B A C. 2767.—φ Pictoris, the 3rd of that Group, is Lac. 1751.

Sequence 37.

January 7, 1838.

1	α Centauri	0.34
2	η Argus	——

3 Arcturus 0.45
4 Procyon 0.85
5 α Eridani 0.93
6 α Crucis 1.14
7 β Centauri 1.21
8 Spica 1.39

9 β Crucis 1.57

10 ε Canis 1.89

11 δ Canis 2.30

12 α Hydræ 2.34
13 δ Argûs 2.44

14 λ Argûs 2.48

15 ζ Argus 2.74

16 α Leporis 3.05
17 α Columbæ 3.09
18 β Leporis 3.39

19 ζ Canis 3.69
20 β Canis Min. 3.70
21 β Columbæ 3.71
22 ζ Hydræ 3.71
23 α Hydri 3.72
24 β Hydri 3.72

25 θ Eridani 3.73
26 γ Hydri 3.75
27 σ Argûs 3.79
28 α Doradûs } = 3.81
29 α Pictoris } 3.81
30 ε Leporis 3.84
31 α Reticuli } = 3.87
32 μ Leporis } 3.87

33 β Doradûs 3.97
34 φ Eridani 4.07
35 α Horologii 4.17
36 ψ Argûs 4.28
37 γ Volantis 4.35
38 ε Columbæ 4.39
39 δ Hydri 4.43
40 ε Hydri 4.48
41 ν 2 Eridani 4.50
42 g Eridani 4.53
43 β Reticuli 4.58
44 p Sceptri 4.62
45 μ Eridani 4.65
46 f 2 Eridani 4.69
47 υ 2 Eridani (52 F.) 4.72
48 Y Eridani (43 F.) 4.75
49 υ Pictoris (Bode) 4.79
50 κ Eridani 4.83
51 γ Doradûs 4.87
52 ι Leporis } = 4.88
53 κ Leporis } 4.88
54 e Eridani } 4.89
55 h Eridani } 4.89
56 y Eridani } 4.89
57 λ Leporis 4.90
58 γ Reticuli 4.91
59 γ Columbæ 4.91
60 α Cœli 4.92
61 γ 1 Cœli 4.92
62 r Sceptri 4.93
63 ω Eridani 4.94
64 λ Columbæ 4.94
65 δ Horologii } 4.95
66 ε Reticuli } 4.95
67 δ Reticuli 4.96
68 λ Eridani 4.97
69 δ 2 Columbæ 4.97
70 θ Columbæ 4.98
71 ψ Eridani 4.99
72 ξ — Horologii } = 5.00
73 B A C. 1103 } 5.00
74 τ Hydri 5.01
75 μ Columbæ 5.01
76 ι Reticuli 5.01
77 ζ Hydri 5.02

78 H C. 19034. } =
79 H C. 19035. }
80 υ 1 Eridani.
81 χ Leporis.

Notes.—Identifications with B A C. of stars disagreeing in their letters, &c.

No. is	B A C.	No. is	B A C.
41	1429	55	1159
42	1201	56	1125
44	1441	62	1451
46	1119	69	1906
47	1433	72	1048
48	1372		1051
49	1933	80	1422
54	1044		

No. 81 is Hist. Cel. 9354.

Unarranged Groups.

1st Group 6 Mag.

1 β Horologii. }
2 γ Horologii. }
3 ρ 1 Cœli.
4 ξ Leporis (8 F.)
5 υ Columbæ.
6 σ Columbæ.
7 B A C. 1773.
8 B A C. 1634.
9 B A C. 1803.
10 $5^h\ 11^m$, $111^\circ\ 40'$.

Notes.—No. 1 is B A C. 931.—No. 3 is B A C. 1559.—No. 5 = B A C. 1947.

2nd Group 6.7 m.

1 β Cœli.
2 η 1 Cœli.
3 B Fornacis.
4 P Eridani.
5 c Eridani (51 F.)
6 ν 1 Eridani.
7 θ Sceptri.
8 ν Leporis.
9 z Sceptri.
10 s Sceptri.
11 H C. 8951.

No. =	B A C.	No. =	B A C.
2	1511	7	1443
3	1273	9	1484
4	1450	10	1498

No. 6 is H C. 8589.

Group 3 below 6.7 m.

1 A Fornacis.
2 q Sceptri.
3 ρ 2 Cœli.
4 ψ Columbæ.
5 H C. 10254.

No. is	B A C.	No. is	H C.
1	1250	2	8996
3	1559		
4	1665		

Note on Sequence 37 in general. A very fine night, but a great deal of moonlight. The following stars of Bode's Chart xviii. were not seen, but are not certainly above 7 m.

1 κ Horologii.
2 M Eridani.
3 o Cœli.
4 κ Cœli.
5 ν Horologii.
6 ξ Cœli.
7 ζ Cœli.
8 η 2 Cœli.
9 ι Cœli.
10 θ Cœli ?
11 ρ 1 Columbæ.
12 ρ 2 Columbæ.
13 π Columbæ.

Sequence 38.

January 10, 1838.

1 α Crucis 1.21

2 β Crucis 1.57

3 γ Crucis 1.72

4 ε Canis 1.75

5 Regulus 1.80
6 ε Orionis 1.85
7 γ Argûs 1.91

8 ζ Orionis 1.98
9 β Argûs 2.02
10 ε Argûs 2.10
11 γ Orionis 2.23
12 δ Canis 2.27

13 δ Argûs 2.34
14 α Hydræ 2.41
15 λ Argûs 2.48
16 β Canis } = 2.53
17 γ Leonis } 2.53

18 ζ Argûs } = 2.66
19 β Leonis } 2.66

20 γ Centauri } = 2.82
21 κ Argus } 2.82

22 η Canis 2.88

23 δ Centauri 2.92
24 ι Argûs 2.95

25 γ Virginis } = 3.00
26 ε Corvi } 3.00
26 ε Corvi } 3.00
27 μ Argûs } 3.08
27 μ Argûs } = 3.08
28 π Argûs } 3.08

29 α Leporis 3.15

30 θ Argûs 3.22
31 α Columbæ 3.28

32 α Muscæ 3.40
33 β Leporis 3.51

34 N Velorum 3.60
35 υ Argûs .... } = 3.61
36 β Columbæ .... } 3.61

37 δ Crucis 3.67
38 γ Hydri 3.70
39 q Carinæ 3.73

40 α Pictoris .... } 3.79
41 o 2 Canis .... } = 3.79
43 α Doradûs .... } 3.79
44 λ Centauri 3.80
45 β Muscæ 3.81
46 ω Argûs 3.83

47 χ Argûs 4.05

48 γ Volantis 4.28

49 ψ Argûs 4.35

50 B A C. 3984 .... 4.43
51 u Carinæ 4.51
52 ϵ Crucis 4.60
53 p Carinæ 4.61
54 l Carinæ 4.63
55 a Mali 4.64

56 σ Centauri 4.66
57 δ Muscæ 4.67
58 I Carinæ 4.69
59 γ Muscæ 4.70
60 O Crucis (Bo.) 4.72
61 γ Chamæl 4.73
62 δ Chamæl 4.75
63 ϵ Chamæl 4.76
64 β Chamæl 4.78
65 α Chamæl 4.79
....
66 x Carinæ 4.83
67 ζ Crucis 4.87

NOTES.—Moon full.—No. 60 is called in the original o Centauri, but this is an evident mistake for O Crucis.

The following Groups of unarranged Stars were also noted in this Sequence.

1st Group of Unarranged Stars.

1 ϵ Muscæ.
2 θ Chamæleontis.
3 η Crucis.
4 B A C. 4189.
5 B A C. 3986.
6 B A C. 4000.

2nd Group of Unarranged Stars.

1 θ 1 Crucis.
2 E Carinæ.
3 G Carinæ.
4 μ 2 Chamæl.
5 h Carinæ.
6 G Carinæ (neb.)
7 B A C. 3923 +

NOTES.—θ 1 Crucis is called in the MS. θ 2, from Bode's map, in which the stars are misplaced. It is the *southern* star.—No. 6 is B A C. 3802.

3rd Group of Unarranged Stars.

1 θ 2 Crucis.
2 z 1 Carinæ.
3 K Carinæ.
4 L Carinæ.
5 μ 1 Chamæl.
6 ι Chamæl.
7 ζ 2 Muscæ.
8 B A C. 4011.
9 B A C. 3976.
10 B A C. 3958.
11 B A C. 3939.
12 12h 14m, 143° 16′.
13 11 24, 149 50.
14 11 23, 149 15.

4th Group of Unarranged Stars.

1 z 2 Carinæ.
2 M Carinæ.
3 ζ Chamæl.
4 B A C. 3960.
5 B A C. 3806.
6 B A C. 3839.
7 B A C. 4001.
8 B A C. 3624.
9 B A C. 3215 +
10 B A C. 3264 +
11 11h 40m, 155° 45′.

SEQUENCE 39.

January 13, 1838.

1 α Centauri 0.34
2 η Argûs .... —
3 Rigel 0.76
4 Procyon 0.85
5 α Eridani 0.93
6 α Orionis 1.00
7 Aldebaran 1.07
8 β Centauri (low) 1.14
9 α Crucis 1.21
10 Pollux 1.51
11 β Crucis 1.57
12 γ Crucis 1.72
13 ϵ Orionis 1.77
14 ϵ Canis 1.89

15 ζ Orionis .... } = 1.99
16 β Argûs .... } 1.99
17 ϵ Argûs 2.08
18 γ Argûs 2.16

19 β Tauri (low) 2.20
20 δ Canis 2.26

21 Castor (low) 2.32
22 δ Argûs .... } = 2.40
23 α Hydræ .... } 2.40

24 γ Geminorum 2.50
25 β Canis 2.58

26 ζ Argûs 2.66

27 κ Argûs 2.75

28 η Canis 2.82

29 ι Argûs 2.90

30 α Leporis 3.02

31 α Columbæ 3.09

32 β Leporis .... } 3.14
33 β Hydri (low) .... } 3.19
34 ι Orionis 3.32
35 α Hydri 3.45
36 υ Argûs 3.58
37 ζ Canis 3.69
38 γ Hydri 3.75
39 q Carinæ 3.76

40 o 2 Canis .... } = 3.77
41 α Pictoris .... } 3.77
42 α Doradûs 3.82
43 α Reticuli 3.85
44 ω Argûs 3.85

45 χ Argûs .... } = 4.06
46 σ Canis .... } 4.06
47 κ 2 Canis .... } = 4.28
48 γ Volantis .... } 4.28

49 o 1 Canis 4.43
50 β Doradûs 4.58
51 ζ Volantis 4.73
52 ν 2 Canis 4.75
53 b Mali .... } 4.81
.... } ....
54 γ Canis .... } 4.81
55 ν 3 Canis.

56 ν 1 Canis.

NOTE.—Moon three days past the full; superb sky.

SEQUENCE 40.

January 21, 1838.

1 Sirius 0.10
2 Canopus 0.22
3 Arcturus (low) 0.45
4 η Argûs .... —
5 β Ceutauri .... } 1.14
6 α Crucis .... } 1.21
7 Spica 1.39
8 β Crucis .... } = 1.60
9 Regulus .... } 1.60
10 γ Argûs .... } 2.01
11 β Argûs .... } 2.11
12 ϵ Argûs 2.17
13 γ Leonis .... } 2.36
14 α Hydræ .... } 2.42
14 α Hydræ .... } = 2.42
15 θ Centauri .... } 2.42
16 δ Canis 2.50
....
17 β Leonis 2.63

NOTE.—Moon rising and flying clouds about.

Sequence 41.

February 24, 1838.

1 Jupiter … —
2 Sirius … 0.10
3 Canopus … 0.22
4 α Centauri … 0.34
5 η Argûs … —
6 Rigel … 0.76

7 α Crucis … 1.14

8 β Centauri … 1.21
9 Spica … 1.39
10 β Crucis … 1.57

11 γ Crucis … 1.72

12 ε Canis … 1.89

13 γ Argûs … 2.11

14 ε Argûs … = 2.23
15 α Hydræ … = 2.23
16 δ Canis … 2.34

17 δ Argûs … 2.44
18 λ Argûs … 2.48

19 β Canis … 2.64

20 γ Centauri … 2.71
21 ζ Argûs … 2.74

22 η Canis … 2.84

23 π Argûs … 2.96

24 α Columbæ … = 3.06
25 μ Argûs … = 3.06
26 δ Centauri … 3.10
27 μ Argûs (*Sic*) … 3.10
28 ρ Argûs … 3.34
29 υ Argûs … = 3.58
30 ν Hydræ … = 3.58
30 ν Hydræ … 3.58
31 δ Crucis … 3.60

32 ξ Argûs … 3.74
33 o 2 Canis … 3.76
34 q Carinæ … 3.76

35 ω Argus … 3.83
36 δ Crateris … 3.86

37 ξ Hydræ … 3.95
38 χ Argus … 4.05

39 β Virginis … 4.14
40 λ 2 Hydræ (41 F.) … 4.24
41 γ Volantis … 4.28
42 k Puppis … 4.29
43 ψ Argus … = 4.35
44 μ Hydræ … = 4.35
45 a Mali … = 4.38
46 ι Hydræ … = 4.38
47 q Monocerotis … 4.41
48 Argus (Fl.) … 4.44
49 q Velorum … 4.48
50 υ 1 Hydræ … 4.52
51 θ Canis … 4.55

52 γ Canis … 4.58
53 c Mali … 4.62
54 f Sextantis (15 F.) … 4.66
55 β Crateris … 4.66
56 φ Leonis … 4.72
57 α Antliæ … 4.75
58 x 1 Centauri … 4.78
59 b Mali … 4.81
. . . .
60 n Monocerotis (26 F.)
61 y Monocerotis.
62 θ Crateris.
63 d Mali.
64 H C. 19034 =
65 H C. 19035 =
66 * Puppis (19 Fl.)
67 η Antliæ.

NOTES.—Nos. 25 and 27, *sic in MS.*—

No.	is B A C.	No.	is B A C.
40	3473	58	4174
47	2825	60	2542
48	2562	61	2975
54	3458	66	2750

48 has the letter τ attached by mistake in Bode.—No. 58 is called in the MS. z 1 Centauri, but this is an obvious mistake for x 1. The B A C. calls this star and its near companion κ 1 and κ 2; but this is also a mistake for x 1 and x 2. The real κ Argûs is B A C. 4928, and is there so correctly lettered; 60 is called γ Monocerotis in B A C.; 61 is Flamsteed's 12 Hydræ.; 66 is Bode's star B in Machina Typographica.

Sequence 42.

February 24, 1838.

1 α Centauri … 0.34
2 Arcturus … 0.45
3 η Argûs … ——
4 Saturn … ——
5 Antares … 1.27
6 β Centauri … 1.14
7 α Crucis … 1.21
8 Spica … 1.39
9 β Crucis … 1.57

10 γ Crucis … 1.72

11 λ Scorpii … 1.86
12 β Argûs … 2.01

13 γ Argûs … 2.11
14 α Trianguli … 2.23
15 θ Scorpii … 2.28
16 α Hydræ … 2.29
17 ε Argûs … 2.30
18 δ Argûs … 2.44

19 λ Argûs … 2.48
20 θ Centauri … 2.55
21 γ Centauri … = 2.72
22 ι Argûs … = 2.72

23 ε Scorpii … 2.78
24 ε Centauri … 2.80
25 α Lupi … 2.83
26 δ Scorpii … 2.86
27 ζ Centauri … 2.88
28 γ Corvi … 2.90
29 η Centauri … 2.91
30 γ Virginis … 2.93
31 β Corvi … 2.95
32 κ Argûs … 2.98
33 θ Argûs … 3.00
34 β Scorpii … 3.02
35 μ Argûs … 3.04
36 κ Scorpii … 3.07
37 δ Centauri … 3.10

38 β Aræ … 3.12
39 ι Centauri … = 3.16
40 ε Corvi … = 3.16
41 β Lupi … 3.22
42 π Scorpii … 3.30
43 α Muscæ … 3.35
44 γ Lupi … 3.36
45 μ 1 Scorpii … 3.37
46 δ Corvi … 3.40
47 α Aræ … 3.40
48 υ Scorpii … 3.42
49 δ Crucis … = 3.46
50 τ Scorpii … = 3.46

51 γ Trianguli … 3.48
52 N Velorum … 3.50
53 γ Hydræ … 3.52
54 β Trianguli … 3.55
55 υ Argûs … 3.58

56 ι Scorpii … 3.61
57 λ Centauri … 3.64
57 λ Centauri … 3.64
58 β Muscæ … 3.66
58 β Muscæ … 3.66
59 κ Centauri … 3.67
60 γ Tubi … 3.70
61 α Circini … 3.73

62 q Carinæ … 3.76
63 σ Scorpii … 3.77
64 π Hydræ … 3.79
65 η Scorpii … 3.80
66 γ Aræ … 3.82
67 ω Argûs … 3.83

68 δ Crateris … 3.85
69 ν Centauri … 3.88
70 μ Centauri … 3.91
71 ι Lupi … 3.95
72 ε Lupi … 3.99
72 δ Lupi … 4.03
73 ζ Lupi … 4.07
74 ζ 2 Scorpii … 4.34
75 φ Centauri … 4.62
. . . .
76 η Virginis.

NOTE.—No. 60 is B A C. 6018, marked as 4 m, but having no letter attached.

Sequence 43.

February 25, 1838.

1 Sirius … 0.10
2 Canopus … 0.22
3 α Centauri … 0.34

4 η Argûs —
5 Rigel 0.76
6 Procyon 0.85
7 α Orionis 0.10
8 α Crucis 1.14
9 β Centauri (low) 1.25
10 Pollux 1.51
11 β Crucis 1.57
12 Regulus 1.62

13 γ Crucis 1.72

14 γ Orionis = 1.90
15 ε Orionis 1.90

16 ε Canis 1.94
17 ζ Orionis 1.97
18 γ Argûs 2.01
19 β Argûs 2.11
20 ε Argûs 2.17
21 α Trianguli 2.23
22 α Hydræ 2.30
23 δ Canis 2.34
24 γ Leonis 2.42
25 δ Argûs 2.44

26 λ Argûs 2.48

27 δ Orionis 2.62
28 γ Centauri = 2.62
29 γ Geminorum 2.62
30 ι Argûs 2.73
31 ε Centauri (*sic*) 2.73
32 ζ Argûs 2.74

33 η Canis 2.83

34 ε Centauri (*sic*) 2.84
35 π Argûs 2.89
36 β Corvi 2.93
37 γ Corvi 2.96
38 δ Centauri 3.00

39 κ Argûs 3.04
40 μ Argûs = 3.11
41 ρ Argûs 3.11
42 δ Corvi = 3.11
43 ζ Centauri 3.11
44 ζ Hydræ 3.21

45 θ Argûs 3.31
46 β Trianguli = 3.40
47 ε Corvi 3.40
48 γ Trianguli 3.52
49 τ Argûs 3.55
50 γ Hydræ 3.57
51 υ Argûs 3.58
52 β Muscæ 3.60
53 δ Crucis = 3.67
54 ν Hydræ 3.67

55 ν Argûs 3.72
56 α Pictoris 3.78
57 σ Argûs 3.79

58 α Circini 3.92
59 χ Argûs 4.05

60 ψ Argûs = 4.18
61 λ 2 Hydræ 4.18

62 γ Volantis 4.28
63 δ Muscæ 4.40
64 α Chamæleontis 4.50
65 δ Chamæleontis 4.55
66 α Mali 4.60

67 δ Volantis 4.64
68 ε Crucis 4.64
69 γ Muscæ = 4.64
70 δ 2 Apodis 4.64
71 β Chamæl. 4.72
72 b Mali 4.81
73 θ Chamæl. 4.91

....

74 c Mali.
75 γ Chamæl.
76 ε Trianguli.
77 ε Chamæl.

NOTE.—Nos. 31 and 34 ε Centauri, twice entered in the original MS.

SEQUENCE 44.

March 28, 1838.

At Sea. Crossing the Line.

1 Sirius 0.10
2 Canopus 0.22
3 α Centauri 0.34
4 Arcturus 0.45
5 η Argûs —
6 Rigel 0.76
7 Procyon 0.85
8 α Orionis 1.00
9 Aldebaran 1.07
10 α Crucis 1.21
11 Spica 1.41
12 β Crucis 1.57
13 Regulus 1.62
14 γ Crucis 1.72
15 ε Canis 1.89
16 α Ursæ 1.93
17 ε Ursæ 1.97
18 β Argûs 2.01
19 α Hydræ 2.17
19 α Hydræ = 2.17
20 ε Argûs 2.17
20 ε Argûs 2.17
21 γ Argûs 2.17

....

22 γ Leonis.
23 η Ursæ.

NOTES.—Nos. 12, 13 β low, Regulus very high; 14, 15 γ low, ε high; 18, 19 β 20° high, α in zenith.

The following short sequences and equalizations were also made for the express purpose of connecting the scales of northern and southern magnitudes.

I. α Hydræ.
δ Canis. =
ζ Ursæ.

....

II. ε Argûs.
β Leonis.
δ Argûs.

....

III. β Leonis. =
γ Centauri.

....

IV. ι Argûs.
γ Ursæ.

....

V. γ Ursæ 7 7 ζ Argus.

....

VI. μ Argûs.
ε Bootis. =
δ Centauri.

....

VII. Cor Caroli. =
θ Argûs.

SEQUENCE 45.

April 14, 1838.

At Sea. Lat. 17° N.

1 Jupiter —
2 Sirius 0.10
3 Canopus 0.22
4 Arcturus 0.45
5 Capella 0.56
6 Procyon 0.76
7 Rigel 0.85
8 α Orionis 1.00
9 η Argûs —
10 Aldebaran 1.07
11 Pollux 1.51
12 Regulus 1.57
13 β Crucis 1.62
14 ε Ursæ 1.79
15 α Ursæ 1.96

16 η Ursæ 2.13
17 α Hydræ 2.30
18 γ Leonis 2.42
19 ζ Ursæ 2.45
20 β Tauri 2.48
21 β Aurigæ 2.52
22 β Leonis = 2.55
23 θ Centauri 2.55
24 γ Ursæ 2.62

25 ε Bootis 2.70
26 β Ursæ 2.78

27 α Coronæ 2.85
28 β Corvi 2.93
29 δ Leonis 2.96

30 β Libræ 2.99
31 γ Corvi 3.02
32 α Libræ 3.05
33 η Bootis 3.08
34 ε Virginis 3.11
35 α Serpentis 3.14
36 γ Virginis 3.17
37 Cor Caroli 3.20
38 ι Centauri 3.22
39 δ Corvi 3.25
40 ε Corvi 3.31

....

41 ψ Ursæ 3.33
42 μ Ursæ 3.35

43 r Lyncis 3.38
44 γ Bootis 3.40
45 ε Leonis 3.43

46 ν Hydræ 3.46
47 γ Hydræ 3.50

48 ζ Hydræ 3.55
49 δ Ursæ 3.61

50 ζ Virginis .... = 3.70
51 δ Bootis .... = 3.70
52 β Bootis 3.80
53 δ Virginis................. 3.90
54 β Virginis................. 4.14
55 ξ Ursæ..................... 4.20
56 λ Bootis 4.26
57 η Virginis................. 4.31

Notes.—6, 7 Procyon at 75° altitude, Rigel at 30°; 13, β Crucis only 12° high when observed; 22, 23 β in Zenith, θ at 35° alt.; 44, called λ Bootis in the MS., but γ was no doubt the star observed.

The following triad is also recorded on this evening.

1 β Ursæ Minoris.
2 γ Crucis.
3 α Polaris.

β Urs. Min. at 30° alt., the others at 15° each.

Sequence 46.

April 15, 1838.

At Sea. Lat. 18° N.

1 ε Ursæ.

2 Castor.
3 α Ursæ.

4 η Ursæ.

5 γ Leonis 2.42
6 β Ursæ Min. .... = 2.46
7 α Hydræ .... = 2.46
8 γ Geminorum 2.50
9 ζ Ursæ.................... 2.54
10 α Polaris 2.59
11 α Coronæ.................. 2.63
12 β Leonis 2.68
13 ε Bootis 2.72
14 β Ursæ.................... 2.76
15 γ Ursæ.................... 2.80
16 δ Leonis 2.85

17 γ Corvi................... 2.90
18 β Corvi................... 2.93
19 γ Virginis................ 2.97
20 Cor Caroli 3.25
20 Cor Caroli .... = 3.25
21 δ Corvi .... = 3.25
22 ε Corvi................... 3.31
....
23 γ Bootis 3.36
24 ψ Ursæ.................... 3.40

25 γ Hydræ .... = 3.45
26 ζ Hydræ .... = 3.45
27 δ Ursæ.................... 3.58

28 ζ Virginis................ 3.70

29 θ Leonis 3.80
30 δ Virginis................ 3.90
31 β Virginis................ 4.14
32 ι Leonis 4.22
33 η Virginis................ 4.31

34 α Crateris.
35 υ Leonis.

Notes.—6, 7, β 23° high and 60°; 10, Polaris 18°; 25, 26, γ 30°, ζ 60° high.

Step I.—*Of the formation of corrected Sequences by the collation of several observed Sequences, and of the elimination of discordant and contradictory observations.*

(226) If observations of this nature could be made with perfect exactness, all sequences in which the same stars occur should present them in the same order of succession, in so far as it may not have been disturbed by a real variability in the stars observed. But as this is very far indeed from being the case, owing to the many disturbing influences, and the slight differences of magnitude between particular stars which have to be discriminated, it is necessary to fix upon some criterion by which the most probable order of arrangement can be discovered among a number of discordant ones. Such a criterion is supplied by an enumeration of cases, in which either of two stars (A and B), whose order is to be settled, has been declared brighter, and in which less bright than the other—allowing the greater number to preponderate. In case of equality of numbers, the equality of the stars must be admitted at least provisionally, and so far as direct comparisons are concerned. But it is a case of very common occurrence, that in arranging the order of three stars, A, B, C, although the direct comparisons between B and C leave it doubtful which of these two is the brighter, yet A may be found on a revision of all the sequences to be decidedly superior to C and not to B, having been compared on different occasions with both these stars, but not both on the same night. In such a case we have ground for placing B above C, while otherwise it would have been left undecided which should be considered the brighter.

(227) To determine therefore the order in which any two stars should be placed in a general sequence (could such be obtained) of all the visible stars, or their order of precedence with respect to each other, all that is necessary is to count the number of times that one of them (A) has been estimated as superior, and as inferior to the other (B). *In such enumerations, an observed equality must be considered as counting both ways.* If the superiorities on the whole preponderate, A must rank in precedence of B; if the contrary, B must take the higher rank: if neither, they must be set down temporarily as equal, or rather as doubtful, leaving the decision to implications arising from the comparisons of both with other stars. If there be no direct comparison recorded between A and B, their order will, of course, come to be determined solely by such implications. If, indeed, they have often been compared, an equality in the numbers of superiorities and inferiorities (especially if occasionally declared *equal*), will afford a presumption of actual equality not to be disturbed by such implications. And on the other hand, if seldom directly compared (once or twice for instance) strong implications arising from much more frequent comparisons with other stars, may suffice to reverse our conclusion respecting their order, drawn from such direct comparison.

(228) It might appear then that so much is left to judgment in such cases, as to induce uncertainty in the final result. But, in fact, it is only in the case of stars which really are nearly equal that doubts on such points ever arise. Push observation and reasoning to what extent we will, there will always be shades of difference too slight for certain discrimination; and practically speaking, I am disposed (from my experience in these reductions) to consider a misarrangement to the extent of a tenth of a magnitude in one of our corrected sequences, *arising from such causes of uncertainty*, as a very unlikely occurrence.

(229) It will occasionally happen, however, that real contradictions, arising from undoubted error of observation, will occur — and it is the spirit of this method to bring

clearly into evidence such irreconcilable discordances, while minor errors eliminate and destroy each other by a system of impartial combination. Thus, for instance, it will sometimes happen that a star D is placed, in consequence of direct comparisons, after several others as A B C, making the order A B C D, while in consequence of indirect implications of the nature above alluded to, the order D A B C would arise. In this case there is a contradiction; and if on examination of the sequences the faulty observation cannot be detected (which it very often may), the star D must be rejected from our corrected sequence; or it may happen that by the sacrifice of this single observation all discordances are reconciled. Thus, in sequences 14 and 42, the star κ *Centauri* is placed below v *Argûs* and N *Velorum*, while in sequence 6 it is placed above them. The preponderance of direct comparisons gives v N κ for the order of precedence. But, on the other hand, in sequence 6, κ is placed also above τ Argûs, which star, from the accumulated evidence of sequences 6, 14, 35, 38 and 43, is superior in brightness to both the other stars v and N, whence the order $\kappa\,\tau\,v$ N would result. Referring, however, to the original sequences, we find that the order $\kappa\,\tau$ is the result of the single comparison in sequence 6, and are therefore left at no loss to conclude that in that sequence κ has been misplaced—and this observation being given up, the order v N κ remains unimpeached. It may serve to show how small are the shades of difference which are thus brought into conflict if we refer to the numerical evaluation of the magnitudes of the stars in question in the subjoined catalogue of stars C, arranged in alphabetical order, where it will be seen that the actual magnitudes are as follows,—viz.: τ Argûs 3.50; v Argûs 3.53; N Velorum 3.60; κ Centauri 3.60,—the extreme range of discordance being no more than one-tenth of a magnitude.

(230) The process practically adopted for the application of this principle to the construction of *corrected sequences*, (by which I mean sequences cleared of conflicting errors), and adopted for amalgamation into *normal sequences*, may be thus explained. Let any extensive observed sequence be fixed upon embracing a considerable amplitude in Right Ascension, and of which a great many stars occur frequently in other sequences,—as for example, sequence 6. Now, in the first place, it is clear that although there may be room for doubt whether particular stars really stand in that sequence in the exact order in which they ought to have been placed, there can be no doubt whatever that if 10 or 12 stars of the sequence, following in succession, be taken, the first in order of occurrence among them is really superior in brightness to the last; and that among all the 12 taken *en masse*, a general downward tendency subsists, though, possibly, here and there interrupted by error of observation in particular instances. Take, therefore, a certain moderate and easily manageable number (say 12*) of stars, the first in order on the sequence, and for convenience of inspection and brevity of writing, denote them by letters of the Roman alphabet, thus†

A = Sirius.	E = Arcturus.	I = Antares.
B = Canopus.	F = β Centauri.	K = Regulus.
C = α Centauri.	G = α Crucis.	L = β Crucis.
D = α Eridani.	H = Spica.	M = γ Crucis.

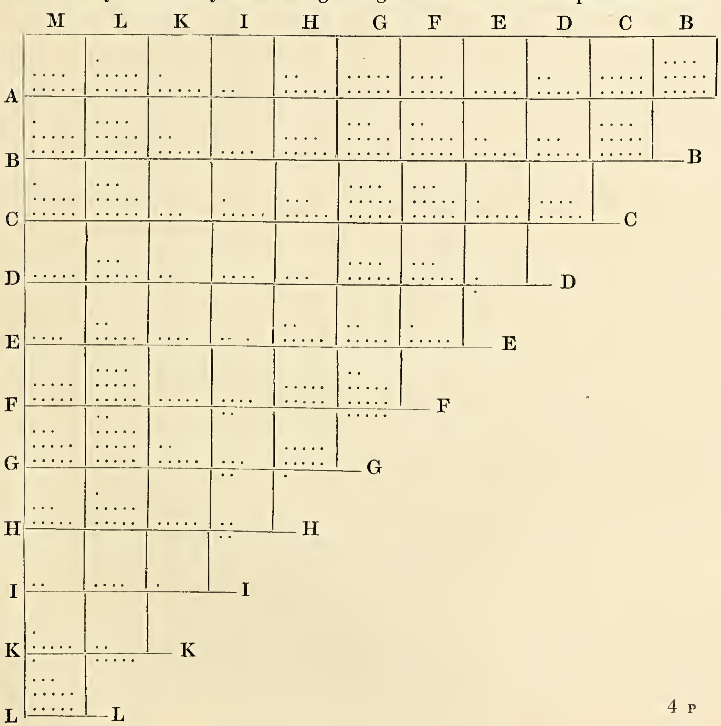
* I find that the use of a full alphabet, or twenty-six at a time, is more than can be easily managed without incurring risk of error: as the names of so many stars cannot be carried in the memory securely while looking down the observed sequences.

† η Argus is omitted, being known to be variable.

Each observed sequence is then to be consulted, and in every one in which two or more individuals of this list occur, they are to be extracted and set down (designated by their assumed letters) in order, omitting all the rest, in manner following :—

Seq.	Order.	Seq.	Order.	Seq.	Order.
4	B C E F G H I L	21	A B D	37	C E D G F H L
5	A B C F H G L M	22	B C E I G F H L M	38	G L M K
6	A B C D E F G H I K L M	26	E I H	39	C D F G L M
7	F G H K L M	30	B D	40	A B E F G H L K
13	A B C E F G H L M	32	A B D	41	A B C G F H L M
15	C D F D I	33	A B C D F G L M	42	C E I F G
16	A B C D F I	34	A B C D F G H L K M	43	A B C G F L K M
18	C D I L	35	D (F = G) L	44	A B C E G H L K M
19	D G	36	A B C D G L M	45	A B E K L

(231) The enumeration of relative superiorities and inferiorities is most compendiously and correctly executed by constructing a diagram in manner here represented :



To fill in this diagram, we begin with the first sequence set down, viz., seq. 4; and since B is there declared to be *superior* to C, E, F, G, H, I and L, we place a dot *above* the horizontal line marked B in each of the vertical columns of cells headed with the other letters C, E, &c. in question. Again, in the same sequence, C being declared superior to E F G H I L, a dot is placed over the horizontal C in the respective columns so indicated, and so on throughout the whole sequence. And the same process is to be carried out through all the other sequences. If in any case (as in seq. 22, in the case of F and I), a letter (I) is declared superior to another, F, which precedes it in the alphabet, the dot, instead of being placed above the horizontal line I, in the vertical column F (for which there is no cell), must be placed *below* the horizontal line F, in the vertical column I. And to avoid mistakes in this (which otherwise are *exceedingly* apt to arise), the better way is to pursue the horizontal line I, from left to right, as if in search of the column F, and on arriving at the letter I at its right hand extremity, thence to direct the eye upwards along the column I till it encounters the horizontal line F, *under* which the dot is to be deposited. These directions may appear trivial and mechanical, but nothing is really trivial by which in long and tedious processes attention is relieved, and mistakes avoided.

(232) When all the sequences are so gone through, the next step is to determine from the comparative numbers of dots above and below each line, the order of succession of the letters: which is best done, systematically, by the construction of another diagram, as here shown. A vertical column and horizontal lines across it being ruled, all the letters in their order, down to the last but one, are to be placed in the cells of the column, and each subsequent letter, as compared with any one preceding it in the alphabet, is to be placed on the right hand in the appropriate horizontal line if the preceding letter be found to have more dots indicating superiority than the contrary: if fewer, on the left (as in the case of the letters L K M in our example). If the numbers be equal, the precedence must be left in doubt (as in the case D $\smile$ E, indicated by the sign $\smile$) if there be only one dot on each part. But if two or more (as is the case with H as compared with I), the stars may be declared equal (H = I), provided no implications of the nature already explained arise to indicate a superiority in either.

	A	B C D E F G H I K L M	
	B	C D E F G H I K L M	
	C	D E F G H I K L M	
	D	F G H I K L M	(D $\smile$ E)
	E	F G H I K L M	
	F	G H I K L M	
	G	H I K L M	
	H	K L M	(H=I)
	I	K L M	
L	K	M	
	L	M	

(233) This done, the order of precedence results, as a matter of course, with more or less consideration, as the case may require. In the example before us, it is

A B C D $\smile$ E F G H = I L K M

or, restoring the Names of the Stars—*Sirius, Canopus, α Centauri,* {*Arcturus* $\smile$ *α Eridani*}, *β Centauri, α Crucis,* {*Spica* $\smile$ *Antares*} *β Crucis, Regulus, γ Crucis.*

(234) If contradictory arrangements result by implication, as above explained, a minute examination of the numbers and of the evidence generally must be gone into, which will almost invariably lead either to the detection of some evidently faulty comparison, or to the

conclusion that the stars concerned are really so nearly equal, that it is of little consequence which is placed first. Not unfrequently, however, it will happen that a star must be thrown out of the sequence altogether, as not determinable from the observations with that degree of precision which is required for the object in view. Still, in such a case, the limits between which its place falls should be noted as affording an approximate value of its magnitude when numerical values come to be assigned. Or it may find a definite place in some other corrected sequence.

(235) We now proceed to the next stars in succession of our original sequence (No. 6). And as in this case the lower star (γ Crucis) has preserved its place at the bottom of the first sub-sequence (so we may term these temporary groups), and as there can be no doubt of the superiority of Regulus to β and γ Argûs, it will suffice to provide for the possibility of a change of order at the junction of the sub-sequence, if we make the last star of the first sub-sequence the first of the second. Denoting, then, the stars of this sub-sequence by letters, thus:—

A = γ Crucis.	E = λ Scorpii.	I = θ Scorpii.
B = β Argûs.	F = α Trianguli.	K = δ Argûs.
C = γ Argûs.	G = γ Centauri.	L = θ Centauri.
D = ϵ Argûs.	H = λ Argûs.	M = ι Argûs.

collecting, as before, the sequences in which these stars occur into one abbreviated synoptic view, by leaving out all intermediate stars, and following out, *mutatis mutandis,* the subsequent steps of our process, we arrive at the following order.

A B C D F I K H L G M

that is to say, γ *Crucis,* β *Argûs,* γ *Argûs,* ϵ *Argûs,* α *Trianguli,* θ *Scorpii,* δ *Argûs,* λ *Argûs,* θ *Centauri,* γ *Centauri,* ι *Argûs.*

The star E or λ Scorpii is rejected from this, and left to find its definite place in another corrected sequence (its place being, however, certainly between γ Crucis and α Trianguli), by reason of the doubtful comparisons $B \backsim E$, $C \backsim E$, and $D \backsim E$. Between D and I also the direct comparisons leave a doubt; but as there is no such doubt with respect to the precedences D F, F I, and I K, the place of I is sufficiently ascertained.

(236) The star A (γ *Crucis*), the last star of the first sub-sequence being left by this process at the head of the second, it is not necessary to re-examine (by a similar process instituted with four or five letters) the order of the stars Regulus, γ Crucis, β Argûs, and γ Argûs, which in the contrary event would have been requisite before the two sub-sequences could be connected into one. We may, therefore, proceed to form a third sub-sequence headed by ι Argûs, the last star of the second. This treated in the same systematic manner, affords for the order of the third sub-sequence, as follows:—

ι *Argûs,* ζ *Argûs,* {α *Lupi* = ϵ *Centauri*}, ζ *Centauri,* η *Centauri,* δ *Centauri,* κ *Argûs,* β *Hydri,* μ *Argûs,* β *Lupi,* ι *Centauri.*

Proceeding exactly in the same manner, we arrive at a fourth sub-sequence (from which κ *Centauri,* which occurs in the original sequence is rejected, its place, however, being certainly between γ *Trianguli* and β *Muscæ*) viz.,—ι *Centauri,* θ *Argûs,* α *Muscæ,* γ *Lupi,* β *Trianguli,*

γ Trianguli, τ Argûs, υ Argûs, δ Crucis, N *Velorum, β Muscæ.* A fifth sub-sequence requires the rejection of λ Centauri, and q Carinæ, and a sixth, of ζ Lupi and γ Volantis, and in all, the overlapping of the sub-sequences remains undisturbed. Assembling then the whole, our final or *corrected* sequence results as follows :—

Sirius.	θ Scorpii.	ι Centauri.	p Carinæ.
Canopus.	δ Argûs.	θ Argus.	α Reticuli ?
α Centauri.	λ Argûs.	α Muscæ.	μ Centauri
Arcturus ?	θ Centauri.	γ Lupi.	ν Centauri.
α Eridani.	γ Centauri.	β Trianguli.	χ Argus.
β Centauri.	ι Argûs.	γ Trianguli.	l Carinæ.
α Crucis.	ζ Argus.	τ Argus.	ι Lupi.
Antares. ?	α Lupi. ?	υ Argus.	φ Argus.
Spica.	ε Centauri.	δ Crucis.	β Reticuli.
β Crucis.	ζ Centauri.	N Velorum.	ε Crucis.
Regulus.	η Centauri.	β Muscæ.	φ Centauri.
γ Crucis.	δ Centauri.	α Circini.	a Carinæ.
β Argûs.	κ Argûs.	γ Hydri.	δ Muscæ.
γ Argûs.	β Hydri.	α Doradûs.	B A C. 3984.
ε Argûs.	μ Argus.	α Pictoris.	
α Trianguli.	β Lupi.	ω Argus.	

(237) In general, however, as we get lower down in a sequence, it becomes necessary to pay continually greater attention to the *overlapping* of our several consecutive groups ; and in order to be quite secure, it is advisable to repeat the whole process with new groups, each consisting of the lower half of one of the old ones, and the upper half of that following it. Moreover, when we come down to stars of the 4th and lower magnitudes, it becomes necessary to embrace a greater number of individuals 16 or even 20 in a group, to give any misplaced star a full and fair opportunity of settling ultimately at its proper level in the corrected series.

(238) Such is the treatment which each observed sequence has to undergo to convert it into a *corrected* sequence, capable of being employed in the subsequent part of our process. Each of the 46 observed sequences has been so treated. The process, though no doubt tedious and laborious, is one of no difficulty ; and once gone through, facilitates, in a remarkable degree, every succeeding step of the work.

STEP II.—*Of the Consilience of Sequences, or the Formation of Normal Sequences, by the partial or entire combination of several corrected ones ; and of the Assignment of a Series of Provisional Magnitudes, to serve as a basis for those to be finally adopted.*

(239) Suppose that in any one sequence the stars A, B, C, D were found, arranged in that order—that in another were found D, E, F, G, so arranged—in a third, an arrangement such as B D G H, and so on. Then it is evident that, if no contradictory arrangements be found to occur in any of the other sequences, A B C D E F G H will be the true order to be finally adopted.

(240) From the mode in which the normal sequences are deduced, as above explained, it is only in comparatively rare cases that contradictory arrangements can occur, since each is formed on the total evidence of all the observed sequences, synoptically brought under review. Whenever they do so, it can only arise from different implications, causing diversity of judgment in the several cases, or from a conflict of the result of implications in one case with that of direct comparison in another. In such cases, the evidence on both sides must be revised, and if found to be irreconcilable, or to give no assured ground of preference, the star which causes the difficulty must be rejected from the normal sequence we are constructing.

(241) As an example, let us take the stars usually considered as of the first magnitude, which occur in our 46 sequences, assigning to each of them a temporary letter, as follows:—

A. Sirius.	G. Rigel.	N. α Crucis.	T. β Crucis.
B. Canopus.	H. Procyon.	O. Antares.	U. Regulus.
C. α Centauri.	I. α Eridani.	P. α Aquilæ.	V. α Gruis.
D. Arcturus.	K. α Orionis.	Q. Spica.	W. α Cygni.
E. Capella.	L. Aldebaran.	R. Fomalhaut.	
F. Lyra.	M. β Centauri.	S. Pollux.	

The corrected sequences in which any two or more of these stars occur, and their arrangements in those sequences respectively are as below.

Seq.	Order.	Seq.	Order.	Seq.	Order.
3	I V	20	G K	36	A B C G H I K L N S T
4	B C D M N O Q T	21	A B G I K R V	37	A D H I M N Q T
5	A B C M N T	22	B C D M N O Q T	38	N T
6	A B C D I M N O Q T U	26	D O Q	39	C G H I K L M N S T
7	G H K M N Q S T U	27	P R V	40	A B D M N Q T U
13	A B C D M N Q T	30	B G I K R L V	41	A B C G M N Q T
15	C F I M N O P R V W	32	A B G I K L	42	C D M N O Q T
16	B C I M O P R V	33	A B C G H I M N T	43	A B C G H K M N S T U
18	C F I O P R T V	34	A B C G H I K L M N	44	A B C D G H K L N Q T U
19	G H I K L N S	35	G H I K L N S T	45	A B D E G H K L S T U

Examining these, we find that F (α Lyræ) cannot be exactly placed, but that the alphabetical arrangement is everywhere followed, with the single exception of the order R L instead of L R in sequence 30. Now, there is no other sequence in which R and L occur together, and this single direct comparison which might have been influenced by some accidental circumstance (as altitude or moonlight), cannot be allowed to stand against the strong implication of sequences 15, 16, and 18, in which R is declared inferior to M, N, O, and P,—all of them inferior to L. Granting, then, that Lyra is rightly placed (as, indeed, I find it to be by subsequent observation made under more advantageous circumstances—it being a low star at the Cape), the final arrangement of the stars in question will be in the order in which they are above set down.

(242) The object of the formation of a normal sequence being to obtain if possible, or as far as possible, an extensive and equal hold upon all the observed and corrected ones, the successive groups of stars to be brought into comparison with each other must be composed of

stars differing only by moderate intervals in respect of brightness, chosen from among all the sequences. The groups, therefore, must for this purpose be as large as can be securely managed; and in treating them according to the method described in Art. (230, 231), (*using, however, now the corrected instead of the observed sequences*), it will be found that by far the greater number will drop out for want of mutual direct comparisons. Nevertheless, it will be found possible to preserve an unbroken chain or scale of magnitudes down to any grade at which we may think fit to stop. I have purposely limited myself to the fifth *full magnitude*, and shall here present the resulting sequence; suppressing, however, all the work (which is exceedingly voluminous, and which it would answer no good purpose to publish), as well as the *corrected* sequences themselves; which, however useful, and, indeed, indispensable, as steps in the process, offer no other point of interest sufficient to compensate for the space they would occupy. Nor is it necessary to refer to them as a test of the correctness of the work, since the normal sequence resulting from them, once obtained, may be tested by comparing it (in the mode already dwelt upon), with the whole mass of the original sequences; and has, in fact, been twice subjected to this ordeal, by breaking it up into two distinct systems of mutually overlapping groups, and found to be sufficiently coherent and consistent with the totality of the evidence to answer every purpose for which it is intended.

Normal Sequence (A) *resulting from the Consilience of corrected Sequences, and subsequently verified by direct comparison with the observed Sequences. First step to the assignment of numerical values as provisional magnitudes of the Stars it comprises.*

Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.
Sirius	1	..	0.10	α Trianguli	2	2.8	2.18	γ Virginis	3	3.0	3.08
Canopus	1	..	0.22	ε Sagittarii	3	2.8	2.22	δ Centauri	3	3.2	3.10
α Centauri	1	1	0.34	θ Scorpii	5	3.1	2.27	κ Argûs	3	2.9	3.13
Arcturus	1	1	0.45	α Hydræ	2	3.5	2.31	α Leporis	3.4	2.9	3.15
Capella	1	1	0.56	δ Canis	3.4	3.5	2.36	α Columbæ	2	2.9	3.17
Lyra	1	1	0.66	β Gruis	3	2.7	2.40	μ Argûs	3	2.9	3.19
Rigel	1	1	0.76	σ Sagittarii	3	2.7	2.44	β Eridani	3	2.9	3.21
Procyon	1	1	0.85	α Arietis	3	2.8	2.48	β Hydri	3	3.1	3.23
α Eridani	1	1	0.93	γ Leonis	2	2.9	2.52	β Lupi	3.4	3.1	3.25
α Orionis	1	1	1.00	δ Argûs	3	2.9	2.55	ι Centauri	3	3.3	3.27
Aldebaran	1	1	1.07	λ Argûs	3.4	2.7	2.58	δ Corvi	3	3.4	3.29
β Centauri	1	1	1.14	γ Geminorum	3	2.9	2.61	ε Corvi	4	3.5	3.31
α Crucis	1	1	1.21	θ Centauri	2	2.8	2.64	π Scorpii	3.4	3.7	3.33
Antares	1	1	1.28	κ Orionis	3	2.5	2.68	α Muscæ	4	3.7	3.35
α Aquilæ	1	1	1.35	β Canis	2.3	2.5	2.71	γ Lupi	4	3.6	3.38
Spica	1	1	1.41	δ Orionis	2	2.5	2.74	α Aræ	3	3.6	3.40
Fomalhaut	1	1.2	1.47	γ Centauri	3	2.5	2.77	υ Scorpii	3.4	3.4	3.42
Pollux	1	1.2	1.53	ι Argûs	2	2.6	2.80	τ Scorpii	3.4	3.2	3.44
β Crucis	2	1.4	1.59	ζ Argûs	3	2.8	2.82	β Trianguli	3	3.4	3.47
Regulus	1	1.7	1.64	ε Scorpii	3	2.8	2.85	γ Trianguli	3	3.4	3.49
α Gruis	2	2.0	1.69	α Lupi	3	3.0	2.88	τ Argûs	4	3.3	3.52
γ Crucis	2.3	2.1	1.74	ε Centauri	3	3.0	2.90	υ Argûs	3.4	3.7	3.54
ε Orionis	2.3	2.5	1.80	η Canis	3	3.0	2.92	δ Crucis	3	3.7	3.56
ε Canis	2.3	2.5	1.86	δ Scorpii	3	3.0	2.95	N Velorum	5	3.8	3.59
ζ Orionis	3	2.4	1.91	ζ Centauri	3	3.0	2.97	λ Centauri	4	3.8	3.61
β Argûs	2	2.3	1.96	γ Corvi	3	2.9	2.99	κ Centauri	3	3.8	3.64
γ Orionis	2	2.2	2.01	η Centauri	3	3.0	3.01	β Muscæ	4	3.4	3.66
γ Argûs	2	2.0	2.09	β Corvi	2.3	3.0	3.03	α Indi	3	3.2	3.69
ε Argûs	2	2.2	2.14	π Argûs	3.4	3.0	3.06	ζ Canis	3	3.5	3.71

Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Interpolated Magnitude.
β Columbæ	3	3.5	3.73	ε Lupi	4.5	4.5	4.16	δ Volantis	5	4.6	4.67
θ Eridani	4.5	3.5	3.75	ζ Lupi	4	4.5	4.19	α Volantis......	5	4.8	4.70
ξ Argûs........	4	3.9	3.77	η Lupi	5	4.2	4.22	δ Ceti..........	4	4.8	4.73
γ Hydri........	3	4.1	3.80	ξ Hydræ	4	4.2	4.25	ζ Volantis	5	4.8	4.76
q Carinæ	5	4.0	3.82	β Virginis	3.4	4.4	4.28	ν 2 Canis	5	4.8	4.79
o 2 Canis	4	4.0	3.84	λ 2 Hydræ	4.5	4.3	4.31	α Chamæl	5	5.0	4.82
α Pictoris	4	4.0	3.87	γ Volantis	5	4.5	4.34	b Mali	5	5.0	4.86
σ Argûs........	4	3.9	3.89	k Puppis	4.5	4.7	4.37	ε Volantis	5	5.0	4.89
α Doradûs......	3	3.9	3.92	a Puppis	5	4.8	4.40	γ Doradûs......	5	5.0	4.92
ω Argûs........	4.5	3.8	3.94	ψ Argûs........	4.5	4.6	4.43	δ Doradûs......	5	5.0	4.95
p Carinæ	4	3.7	3.97	ε Columbæ	4	4.5	4.46	θ Chamæl	5	5.0	4.98
δ Crateris	3.4	3.7	3.99	δ Hydri........	4	4.5	4.49	ζ Doradûs	5	5.0	5.01
α Reticuli	3.4	3.6	4.02	ε Hydri	5	4.4	4.52	ε Doradûs	5	5.0	5.03
γ Phœnicis	3	3.6	4.05	β Volantis	5	4.4	4.55	ξ Horologii	4.5	5.0	5.06
μ Centauri......	4	3.9	4.08	β Reticuli	4	4.6	4.58	ζ Hydri........	5	..	5.09
ν Centauri......	4	4.1	4.11	ε Crucis........	4	4.6	4.61	B A C. 956	5	..	5.12
δ Lupi	5	4.3	4.14	φ Centauri......	5	4.6	4.64				

(243) The first step which is here made to the assignment of numerical values to the magnitudes, is based on the following principle. The first column of numbers contains (so to speak) the rough magnitudes as set down in the catalogue of the Astronomical Society; that being the system of magnitudes to which, on a general average, it has been resolved to conform, agreeably to what is stated in Art. (217). These, it will be observed, run very unequally; and it is sufficient to cast an eye down this column to be fully satisfied of the necessity of a reformation in the practice of astronomers in this department of their science. In order, in some degree, to smooth down their grosser irregularities, and prepare them for graphical interpolation by means of a curve, the second column of numbers exhibits for each star the mean of its own magnitude as stated in the former column, and those of the two stars immediately preceding, and the two immediately following it in order. Thus, 2.1, the number in this column opposite to γ Crucis, is the mean of 1, 2, $2\frac{1}{2}$, $2\frac{1}{2}$, $2\frac{1}{2}$, the rough magnitudes of the five stars, among which γ Crucis occupies the middle place. Taking now the numerical order of each star from the beginning of the sequence for an abscissa, and erecting, on a chart of engraved squares, an ordinate equal to the mean so derived for that star, a series of points is obtained, still very irregularly disposed, but in which it is easy to recognise the prevalence of a tendency towards the formation of a curve of magnitudes, which is accordingly drawn, on a general impression of its whole aspect as agreeing best with the distribution of the points laid down, entirely regardless of the abrupt and irregular undulations they would appear to indicate, which are manifestly caused by enormous errors in the original magnitudes from which we set out; as, for instance, that of 5 assigned as the magnitude of θ Scorpii, 2 to α Columbæ, 5 to q Carinæ, &c. This curve is then read off, and the readings set down in the last column, which therefore exhibits a series of magnitudes which, while they tend always in the right direction, conform to the system of our adopted catalogue as nearly as the errors and contradictions of that system will allow; and are therefore fitted to afford a consistent basis to our further operations.

(244) The earlier part of the scale is arbitrary, and is founded on a purely imaginary—perhaps a fanciful idea of the rounding off of the curve at its origin. It suffices, however (which

is all that is at present needed), to keep the order of the larger stars distinct. Theoretically, correct numbers can only be assigned by photometric measurements, with which, in this stage of the inquiry, we have no concern.

(245) This first approximation being made to numerical values of the magnitudes of all the stars in our normal sequence, places it in our power greatly to extend that sequence, and to take in a multitude of stars whose magnitudes are on the whole quite satisfactorily *defined* by the corrected sequences in which they occur, but which were rejected, or which dropped out for want of connecting links referring them strictly to their immediate predecessors and successors in the scale. Take, for example, β Ceti. This star in the *corrected* sequence No. 21, is found between δ Argûs (2.55) and κ Orionis (2.68), being the only star in that sequence intermediate between them. The arithmetical mean between these values is 2.61. Again, in the *corrected* sequence No. 28, I find interposed between α Arietis (2.48), and β Hydri (3.23), three stars, β Ceti, and α Phœnicis, and α Ceti, from which, supposing these arithmetical means equidistant from each other and the two extremes, we find the value 2.67. And, again, in the corrected sequence No. 30, I find β Ceti singly interposed between β Arietis (2.48) and κ Orionis (2.68), which affords a third value 2.58 for the numerical expression of its magnitude on this scale. The mean of these three determinations 2.62, which may be regarded as the magnitude (*on this scale*) within very moderate probable limits of error.

(246) So, again, to take another instance, in the case of α Circini. In corrected sequence 6, it is found to occur singly interposed between N Velorum, 3.63, and γ Hydri, 3.80, which gives as a medium value for the star in question, 3.71. In corr. seq. 14, it occurs in like manner singly interposed between β Muscæ, 3.63, and ω Argus, 3.94, whence arises 3.78 as another interpolated value. Again, in cor. seq. 23, it stands as the second of four stars interposed between δ Crucis 3.55 and η Lupi 4.21, whence we get 3.81 for a third value. In cor. seq. 42, it is singly interposed between β Muscæ, 3.63, and q Carinæ, 3.82, giving 3.72; and, lastly, in cor. seq. 43, it is the first of two interposed between β Muscæ 3.63 and α Pictoris, 3.87, whence we get 3.71 for an interpolated magnitude. Assembling these five results, and taking their mean, we finally arrive at 3.75 for the provisional magnitude of α Circini.

(247) In this manner provisional values of all the stars which occur in the corrected sequences interposed between the stars of our normal list have been obtained, and a new and much more extensive normal sequence constructed by inserting them in their proper places among the stars of that list. This sequence has then been treated exactly as the original normal sequence of which it is an extension, and is presented below. Col. 1, contains the names of the stars; col. 2, their rough magnitudes from the catalogue; col. 3, their equalized magnitudes, and col. 4, their interpolated magnitudes read off from a curve constructed as already explained. The stars of the first magnitude, as low as β Crucis inclusive, remaining unchanged in this process, are omitted.

Provisional Magnitudes. Sequence (B) *resulting from the extension of Sequence* (A) *by the Interpolation of Stars from the corrected Sequences.* (*Italics indicate Stars which occur in Sequence* A.)

Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.
Regulus	1	..	1.62	η Ophiuchi	2.3	2.8	2.94	κ *Centauri*	3	3.6	3.66
α *Gruis*	2	..	1.67	π *Argûs*	3.4	2.7	2.96	β *Muscæ*	3	3.4	3.67
γ *Crucis*	2.3	2.2	1.72	γ *Virginis*	3	2.7	2.97	ζ *Virginis*	4	3.2	3.68
ε *Orionis*	2.3	2.6	1.77	ζ Ophiuchi	—	—	—	α Indi	3	3.3	3.68
ε Ursæ	3	2.7	1.81	β Scorpii	2	2.8	2.98	ζ *Canis*	3	3.3	3.69
λ Scorpii	3	2.5	1.85	γ Pegasi	2.3	2.7	2.99	β Phœnicis	3.4	3.5	3.70
ε *Canis*	2.3	2.6	1.89	δ *Centauri*	3	2.8	3.00	β *Columbæ*	3	3.7	3.71
α Ursæ	1.2	2.4	1.93	δ Ophiuchi	3	3.0	3.02	ε Hydræ	5	4.0	3.72
ζ *Orionis*	3	2.3	1.97	ζ Sagittarii	3.4	3.2	3.03	α Circini	4	4.1	3.72
β *Argûs*	2	2.2	2.01	κ Scorpii	—	—	—	θ *Eridani*	4.5	4.1	3.73
η Ursæ	2.3	2.3	2.04	κ *Argûs*	3	3.1	3.04	ξ *Argûs*	4	4.1	3.74
γ *Orionis*	2	2.1	2.08	β Herculis	—	—	—	γ *Hydri*	3	4.1	3.75
γ *Argûs*	2	2.1	2.11	α *Leporis*	3.4	3.1	3.05	q *Carinæ*	5	4.1	3.76
α Pavonis	2	2.0	2.14	β Libræ	2.3	2.8	3.06	o 2 *Canis*	4	4.3	3.76
ε *Argûs*	2	2.0	2.17	η Bootis	3	2.8	3.08	π Hydræ	4.5	4.5	3.77
β Tauri	2	2.2	2.20	α *Columbæ*	2	2.8	3.09	ν Argûs	5	4.3	3.78
α *Trianguli*	2	2.8	2.23	μ *Argûs*	3	2.9	3.10	α *Pictoris*	4	4.3	3.78
ε *Sagittar.*	3	2.8	2.26	ε Virginis	3.4	2.8	3.11	η *Scorpii*	4	4.2	3.79
θ *Scorpii*	5	3.0	2.28	α Libræ	3	3.0	3.12	σ *Argûs*	4	3.8	3.79
α *Hydræ*	2	3.3	2.30	α Cor. Carol	2.3	2.9	3.14	ε Gruis	4	3.6	3.80
β Ursæ Min.	3	3.3	2.32	β *Eridani*	3	3.0	3.15	γ Aræ	3	3.5	3.81
δ *Canis*	3.4	2.9	2.34	α Serpentis	2.3	3.0	3.16	α *Doradûs*	3	3.6	3.82
β *Gruis*	3	3.1	2.36	λ Sagittarii	4	3.2	3.18	δ Virginis	3.4	3.6	3.83
σ *Sagittarii*	3	2.9	2.38	β *Hydri*	3	3.2	3.19	ω *Argûs*	4.5	3.8	3.83
α Arietis	3	2.8	2.40	β *Lupi*	3.4	3.4	3.21	ε Leporis	4	3.9	3.84
γ *Leonis*	2	2.7	2.42	ι *Centauri*	3	3.2	3.22	p *Carinæ*	4	4.0	3.85
δ *Argûs*	3	2.8	2.44	δ Sagittar.	3.4	3.0	3.24	δ *Crateris*	3.4	3.8	3.86
ε Pegasi	2.3	2.8	2.46	δ *Corvi*	3	2.9	3.25	c Puppis	4	4.0	3.87
λ *Argûs*	3.4	3.0	2.48	θ Argûs	2	3.1	3.26	α *Reticuli*	3.4	3.9	3.87
γ *Geminor*	3	2.9	2.50	β Aræ	3	3.2	3.28	μ Leporis	5	3.8	3.88
ζ Ursæ	3	2.8	2.51	β Leporis	4	3.3	3.29	σ Canis	3.4	3.7	3.89
β Ceti	2.3	2.5	2.53	ε *Corvi*	4	3.5	3.31	γ *Phœnicis*	3	3.8	3.90
θ *Centauri*	2	2.4	2.55	π *Scorpii*	3.4	3.7	3.32	η Virginis	3.4	3.6	3.91
β Aurigæ	2	2.4	2.57	α Toucani	3	3.6	3.33	μ *Centauri*	4	3.7	3.92
κ *Orionis*	3	2.3	2.59	α Muscæ	4	3.6	3.35	ν *Centauri*	4	4.1	3.93
α Polaris	2.3	2.4	2.60	ρ Argûs	3.4	3.7	3.36	φ Eridani	—	—	—
α Pegasi	2	2.4	2.62	γ *Lupi*	4	3.7	3.38	κ Ophiuchi	4	4.0	3.94
β *Canis*	2.3	2.3	2.64	σ Scorpii	4	3.6	3.39	δ *Lupi*	5	3.9	3.95
δ *Orionis*	2	2.2	2.65	α *Aræ*	3	3.6	3.40	μ Serpentis	3	3.8	3.96
β Leonis	2.3	2.1	2.67	μ 1 Scorpii	3.4	3.7	3.42	γ Scorpii	3.4	3.6	3.97
α Cor. Bor.	2	2.3	2.68	υ *Scorpii*	3.4	3.6	3.43	β Serpentis	3.4	3.2	3.98
α Ophiuchi	2	2.3	2.70	ι Scorpii	4.5	3.9	3.44	ε Ophiuchi	3	3.5	3.99
γ *Centauri*	3	2.4	2.71	τ *Scorpii*	3.4	3.8	3.45	χ Argûs	3	3.6	4.00
ι *Argûs*	2	2.4	2.73	π Sagittarii	4.5	4.0	3.46	ε *Lupi*	4.5	3.6	4.02
ζ *Argûs*	3	2.6	2.74	γ Aquilæ	3	3.7	3.48	o Argûs	4	3.8	4.04
β Pegasi	2	2.6	2.75	γ Hydræ	4.5	3.6	3.49	β Toucani	3.4	4.0	4.05
ε Bootis	3	2.6	2.77	β *Triang.*	3	3.3	3.50	ζ Lupi	4	4.1	4.07
α Phœnicis	—	—	—	β Arietis	3	3.3	3.51	κ 2 Canis	4	3.9	4.09
ε *Scorpii*	3	2.6	2.78	γ *Triang.*	3	3.2	3.52	η *Lupi*	5	4.2	4.10
γ Ursæ	2	2.6	2.79	α Hydri	3	3.4	3.54	γ Ceti	3	4.2	4.12
α *Lupi*	3	2.6	2.80	τ *Argûs*	4	3.5	3.55	α Horologii	5	4.2	4.13
β Ursæ	2	2.6	2.81	ζ Hydræ	4	3.6	3.56	ξ *Hydræ*	4	4.2	4.15
ε *Centauri*	3	2.8	2.83	ι Orionis	3.4	3.8	3.57	λ Canis	4	4.4	4.16
η *Canis*	3	2.8	2.84	υ *Argûs*	3.4	3.6	3.58	a Carinæ	5	4.4	4.17
δ *Scorpii*	3	3.0	2.86	ν Hydræ	4	3.4	3.59	χ Eridani	4	4.3	4.19
δ Leonis	3	3.0	2.87	δ *Crucis*	3	3.7	3.60	φ 1 Lupi	5	4.4	4.20
ζ *Centauri*	3	3.0	2.88	β Can. Min.	3	3.8	3.61	β *Virginis*	3.4	4.3	4.22
γ *Corvi*	3	2.9	2.90	N *Velorum*	5	3.8	3.62	ι Lupi	4.5	4.5	4.23
η *Centauri*	3	2.8	2.91	q Orionis	4	4.0	3.63	λ 2 *Hydræ*	4.5	4.3	4.24
α Ceti	2.3	2.7	2.92	λ *Centauri*	4	4.0	3.64	κ Lupi	5	4.6	4.26
β *Corvi*	2.3	2.8	2.93	γ Gruis	4	3.6	3.65	β Cancri	4	4.6	4.27

Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.	Star's Name, Constellation, and Letter.	Magnitude per Catalogue.	Equalized Magnitude.	Provisional Magnitude.
γ Volantis	5	4.7	4.28	g Eridani	5	4.6	4.54	ρ Lupi	5	4.8	4.78
k Puppis	4.5	4.7	4.29	β Hydræ	4	4.4	4.55	α *Chamæleontis*	5	4.8	4.79
l Carinæ	5	4.5	4.30	υ 1 Centauri	5	4.4	4.56	ξ 2 Centauri	5	5.0	4.80
a *Puppis*	5	4.3	4.32	δ Phœnicis	4	4.4	4.57	b *Mali*	5	5.1	4.81
ζ 2 Scorpii	3	4.3	4.33	β *Reticuli*	4	4.4	4.58	γ Apodis	5	5.1	4.82
γ Toucani	4	4.1	4.34	ζ Crucis	5	4.4	4.59	f Centauri	5.6	5.1	4.83
ψ *Argûs*	4.5	3.9	4.35	ε *Crucis*	4	4.6	4.60	ε Toucani	5	5.0	4.84
μ Hydræ	4	4.3	4.36	κ Phœnicis	5	4.7	4.61	ε *Volantis*	5	5.0	4.85
o 1 Canis	4	4.5	4.37	φ *Centauri*	5	4.7	4.62	α Apodis	4.5	4.9	4.86
ι Hydræ	5	4.4	4.38	η Crucis	4.5	4.9	4.63	γ *Doradûs*	5	4.9	4.87
π Lupi	5	4.4	4.39	δ *Volantis*	5	4.9	4.64	δ Chamæleontis	5	4.9	4.88
ε *Columbæ*	4	4.6	4.40	σ Centauri	5	4.9	4.65	ζ Toucani	5	5.0	4.89
ε Phœnicis	4	4.4	4.41	α *Volantis*	5	4.9	4.65	δ *Doradûs*	5	5.0	4.90
ζ Phœnicis	5	4.4	4.42	I Carinæ	5	4.8	4.66	θ *Chamæleontis*	5	5.0	4.91
δ *Hydri*	4	4.6	4.43	ι Eridani	4.5	4.8	4.67	β Chamæleontis	5	5.0	4.92
υ Pictoris	5	4.7	4.44	κ Eridani	4.5	4.6	4.68	ζ *Doradûs*	5	5.0	4.93
μ Lupi	5	4.5	4.45	δ Toucani	5	4.6	4.69	λ Phœnicis	5	5.0	4.94
β Pictoris	4.5	4.7	4.46	δ *Ceti*	4	4.5	4.70	ε Reticuli	5	5.0	4.95
β Doradûs	4	4.5	4.47	p Velorum	5	4.6	4.71	ε *Doradûs*	5	5.0	4.96
ε *Hydri*	5	4.5	4.48	δ Muscæ	4	4.4	4.72	γ Reticuli	5	5.2	4.97
φ Argûs	4	4.5	4.49	ζ *Volantis*	5	4.6	4.73	η Toucani	5	5.1	4.98
u Carinæ	5	4.7	4.50	γ Muscæ	4	4.6	4.73	B A C. 1103	6	5.1	4.99
a Mali	4.5	4.7	4.51	O Crucis	5	4.8	4.74	ξ *Horologii*	4.5	5.1	5.00
β *Volantis*	5	4.7	4.51	ν 2 *Canis*	5	4.6	4.75	f 1 Eridani	5	5.1	5.01
B A C. 2562	5	4.7	4.52	η Phœnicis	5	4.8	4.76	ζ *Hydri*	5	—	5.02
ν 2 Eridani	4	4.6	4.53	q Velorum	4	4.8	4.77	*B A C.* 956	5	—	5.03

(248) Five stars, viz., α Phœnicis, ζ Ophiuchi, κ Scorpii, β Herculis, and φ Eridani, which occur in the corrected sequences having been accidentally omitted in the process by which the provisional magnitudes in this list were obtained, are here inserted in their places, but without annexed numbers. As their omission from among the data cannot have the smallest perceptible effect on the final result, it has not been thought necessary to go over again the whole of the subsequent work on that account.

STEP III. *Of the Complete Interpolation of the observed Sequences, the conclusion of an Independent Numerical Result from each Observation of each Star, and the assemblage of their results for the final Determination of its Magnitude.*

(249) The whole of the work, up to the actual point at which we are arrived, is merely preliminary, and has for its object to enable us to assign to each star, in each observed sequence, a numerical magnitude which shall be at the same time individual as regards that particular sequence (*i. e.*, affected with the peculiar errors of observation which prevail in that sequence), and yet comparable with the general scale of magnitudes which prevails through all the sequences collectively.

(250) To this end, in every *observed* sequence, opposite to each star therein which occurs in the extended normal sequence B, is to be written the provisional numerical magnitude assigned to it in the last column of that sequence, leaving the intermediate stars without

numbers. If the sequence, then, *were corrected* ones, or if they were free from error of observation, the numbers so written in each would form an uninterruptedly increasing series, each being greater, or, at all events, not less than all which follow it. In many they do so; and in such cases all that remains to do, is to interpolate values to fill up the blanks on the principle already explained in Art. (245). But in other instances such is not the case, owing to accidental error in the observations themselves, and to possible remaining error in the provisional magnitudes used, which, though not considerable, certainly must, in some cases, affect the order of the stars, as arranged by them alone. Thus, to take an example: in sequence 20, the stars succeed each other in the order here set down, and the arithmetical order of precedence is interrupted in the cases of α Leporis and ζ Canis, in the 2d column annexed. Taking, then, a chart of engraved squares, laying down points corresponding to the abscissas 1, 2, 3, 8, 9, 10, 11, and the respective ordinates 2.84, 3.05, 2.96, 3.71, 3.69, 3.74, 3.76, and passing an interpolating curve among them, we find, by reading off its ordinates for *all* the abscissas from 1 to 11, the values set down in the last column, not only for the seven stars which furnished the original (but now abandoned) points, but also for the four intermediate ones. And thus we proceed in all similar cases; only, in constructing these curves, we must be careful to keep *as near to all the points* as the condition of a continual increase of the ordinate will allow.

η Canis	2.84	2.84
α Leporis	3.05	2.99
π Argus	2.96	3.10
β Can. Min.	—	3.20
ι Orionis	—	3.30
β Leporis........	—	3.41
q Orionis........	—	3.51
β Columbæ	3.71	3.62
ζ Canis..........	3.69	3.69
ξ Argûs	3.74	3.72
o 2 Canis........	3.76	3.76

(251) In cases where the intervals are large, as they sometimes are, a good deal of discretion and latitude must exist, especially where the intervals are irregular, and the number of intermediate stars considerable. Error is thus, of necessity, induced. And it would seem, moreover, that by adopting the newly interpolated magnitudes *for the normal stars* as well as for the intermediate ones, to the exclusion of their provisional magnitudes, we are undoing what we have taken considerable pains to do, and in effect reviving and bringing again into view errors of observation which the object of all the former part of the process was to smooth down and obliterate. An attentive consideration of the several steps will show that this is unavoidable, and that in no other way can the sequences be impartially treated so as to preserve a due relation between the interpolated and the normal stars. And when the individual results for stars which occur in several sequences are assembled, and means taken, the normal magnitudes are found to be, in effect, very nearly indeed re-produced, as will presently appear.

(252) The process above indicated having been carried out in each observed sequence, so far downwards as the normal list B extends, and a dotted line . . . . drawn in each sequence below the last *normal* star which occurs in it (as in sequence 1, below τ Scorpii—in seq. 2, below α Aræ, &c.) each star above such dotted line will have assigned to it a numerical magnitude comparable with all the rest. And these are the values which, so obtained, are set down opposite to the names of the stars in all the observed sequences above recorded. A general index then being made of the stars which occur in all the sequences, all the individual values so found assigned to each star are assembled together. Of these a final mean is taken

in those cases where the star only occurs *above the dotted lines,* reserving the cases of stars which occur in some sequences above, and in some below them, and in which, therefore, all the values cannot yet be assigned numerically for subsequent determination.

(253) Table (C) annexed below, exhibits this assemblage of individual results, according to an alphabetic arrangement, which makes it easy to refer to it for any particular star whose magnitude may be wanted. The mean results which have no asterisk (*) annexed to them are those obtained in conformity with the conditions of the last article, and which depend directly on the normal stars alone, or which are themselves normal.

(254) These values, when obtained, are used to continue the interpolation downwards below the limit where the normal stars cease to afford us their aid. They are treated for this purpose exactly as described in Art. (250, &c.), and the interpolating curves being constructed and read off, the resulting magnitudes are attached to their respective stars below the dotted line, which done, another double dotted line is drawn (when necessary) marking the lower limit of this second or supplementary interpolation in each sequence; as, for instance, in sequence 1 below η Scorpii, in 2 below γ Aræ, &c. And proceeding with these values, as with those of the first interpolation, the results are obtained which in Table C are marked with a single asterisk (*). These, again, are employed to continue the interpolation yet one stage lower, below the doubly dotted line, by which a few more (confessedly very precarious) results marked with two asterisks (* *) are obtained.

(255) There still remain outstanding some portions of the sequences which, for want of data in accordance with the normal data of sequence B, cannot be interpolated. These we must leave till further observation shall enable some future inquirer who may be disposed to follow up this subject on the plan here sketched out, to interlink them with the general mass. Nearly the whole of sequence 29 is in this predicament, and the greater portion of sequel 27. Meanwhile the number of stars (452) to which, now for the first time, magnitudes upon a systematic plan have been assigned, is considerable enough to serve as a fair specimen of the practical application of our method. I may add, too, that since my return to England I have been, and am still, engaged in extending its application to the northern stars, with some perseverance, and I venture to hope not without some corresponding degree of success. Sixty-one sequences, in addition to those above recorded, have been observed and partially reduced, and where completely so, and brought into comparability with the southern sequences by means of the intertropical stars common to both series, will afford a uniform system of astrometrical nomenclature on which I have every reason to believe considerable reliance may be placed. This work, however, besides that it is as yet incomplete, cannot properly find its place in a volume of Southern Observations.

(C) *Assemblage of individual Results from the Interpolation of the observed Sequences, and final Determination of the Magnitudes to be adopted. [For Stars brighter than Regulus, see the Magnitudes assigned in the Normal Sequence, A].*

N.B. The first numbers in each line refer to the observed Sequences, from which the others, expressing the Magnitudes whose mean is taken, are derived.

α Androm.

16	2.25

α Antliæ.

41	4.75

α Aquarii.

27	2.97

α Aræ.

2	3.40
42	3.40
	3.40

α Arietis.

21	2.40
28	2.40
30	2.40
31	2.40
	2.40

α Apodis.

8	4.85

α Can. ven. Cor Caroli.

45	3.20
46	3.25
	3.22

α 2 Capric.

27	3.94

α Ceti.

28	3.46
30	2.82
	3.14

Somewhat doubtful.

α Chamæl.

8	4.79
21	4.79
30	4.88
38	4.79
43	4.50
	4.75

α Circini.

6	3.74
14	3.75
23	3.80
42	3.73
43	3.92
	3.78

α Cæli.

37	4.92

α Columbæ.

19	3.05
21	3.36
30	3.18
32	3.09
35	3.13
37	3.09
38	3.28
39	3.09
41	3.06
	3.15

α Cor. Bor.

46	2.63

α Corvi.

22	4.61
23	4.61
35	4.68+
	* * 4.63

α Cygni.

16	1.95

Very doubtful.

α Doradûs.

6	3.78
16	3.82
21	3.78
30	3.80
35	3.75
36	3.82
37	3.81
38	3.79
39	3.82
	3.80

α Fornacis.

28	* 4.55

α Geminor. Castor.

7	1.97
19	2.02
35	1.67
39	2.32
	1.99

α Gruis.

3	1.67
15	1.61
16	1.67
18	1.67
21	1.67
27	1.67
30	1.67
	1.66

α Herculis.

26	3.28

Variable.

α Horolog.

37	4.17

α Hydræ.

7	2.58
19	2.08
34	2.41
35	1.75
36	2.32
37	2.34
38	2.41
39	2.40
40	2.42
41	2.30
42	2.29
43	2.30
44	2.17
45	2.30
46	2.46
	2.30

Variable ?

α Hydri.

3	3.26
17	3.46
21	3.26
28	3.83
30	3.37
36	3.62
37	3.72
39	3.45
	* 3.44

Variable ?

α Indi.

16	3.68
17	3.75
21	3.55
27	3.68
	3.67

α Leonis Regulus.

6	1.62
7	1.48
34	1.62
38	1.80
40	1.62
43	1.62
	1.61

α Leporis.

19	2.83
20	2.99
21	3.05
30	2.94
32	3.05
35	2.80
36	3.08
37	3.05
38	3.15
39	3.02
	3.00

α Libræ.

14	3.15
26	3.16
45	3.05
	3.12

α Lupi.

5	2.80
6	2.80
10	2.80
11	2.81
12	2.81
13	2.83
14	2.83
26	2.84
42	2.83
	2.82

α Muscæ.

6	3.35
14	3.36
25	3.66
35	3.45
38	3.40
42	3.35
	3.43

α Normæ.

23	* 4.67

α Ophiuchi.

26	2.67

α Pavonis.

14	2.55
15	2.29
16	2.26
18	2.33
21	1.99
27	2.50
30	2.40
	2.33

Variable ?

α Pegasi.

16	2.65

α Phœnicis.

3	2.64
16	2.92
21	2.62
28	2.92
30	2.70
	2.78

α Pictoris.

6	3.82
16	3.56
21	3.64
30	3.80
35	4.09
36	3.68
37	3.81
38	3.77
39	3.78
43	3.78
	3.77

α Piscium.

28	4.13
31	4.34
	* 4.19

α Reticuli.

6	3.87
16	3.87
21	4.09
30	3.87
35	4.02
36	3.87
37	3.87
39	3.85
	3.91

α Serpentis.

45	3.14

α Toucani.

3	3.40
16	3.38
17	3.30
21	3.09
27	3.08
30	3.61
	3.32

α Trianguli.

5	2.23
6	2.23
7	2.23
13	2.23
15	2.26
16	2.23
23	2.23
42	2.23
43	2.23
	2.23

α Ursæ.

44	1.93
45	1.96
	1.94

α Ursæ Min. Polaris.

46	2.59

α Volantis.

9	4.65
21	4.65
30	4.53
36	4.83
	4.66

β Aquarii.

27	2.85

β Aræ.

2	3.50
42	3.12
	* 3.31

β Argus.

5	2.06
6	2.01
7	2.01
13	2.01
21	2.01
22	1.92
23	2.11
24	2.11
25	2.11
32	1.95
33	2.01
34	2.11
35	1.99
36	2.01
38	2.02
39	1.99
40	2.11
42	2.01
43	2.11
	2.03

β Arietis.

30	3.49

β Aurigæ.

45	2.51

β Bootis.

45	* 3.80

β Cancri.

35	4.27

β Canis.

7	2.48
19	2.41
20	2.64
32	2.64
33	2.64
35	2.64
36	2.56
38	2.53
39	2.58
41	2.64
	2.58

β Can. Min.

20	3.20
35	3.65
36	3.49
37	3.32
	3.41

β Capricor.

27	3.32

β Ceti.

16	2.24
21	2.51
28	2.66
30	2.43
	2.46

β Chamæl.

8	4.91+
38	4.78
43	4.72
	* 4.80+

β Columbæ.

20	3.62
21	3.73
32	3.37
37	3.71
38	3.61
	3.61

β Corvi.

7	2.80
14	2.93
22	2.93
23	2.93
25	3.00
35	3.19
42	2.95
43	2.93
45	2.93
46	2.93
	2.95

β Crateris.

41	4.66

β Doradûs.

21	4.67
30	4.40
34	3.92
37	3.97
39	4.58
	4.31

β Eridani.

19	3.20
30	3.06
32	3.44
35	3.06
36	3.55
	3.26

β Gruis.

3	2.36
15	2.38
16	2.36
21	2.21
27	2.36
28	2.36
30	2.46
31	2.36
	2.36

β Herculis.

26	3.02

β Hydræ.

35	4.45

β Hydri.

3	3.19
6	3.08
16	3.19
17	3.19
21	3.17
28	3.19
30	3.27
34	3.19
36	3.62
37	3.72
39	3.19
	3.27

Variable ?

β Indi.

17	* 4.22

β Leonis.

7	1.91
38	2.66
40	2.50+
45	2.55
46	2.68
	2.63

Rejecting 1.91 and 2.50 +

β Leporis.

19	3.42
20	3.41
21	3.72
32	3.20
35	2.97
36	3.36
37	3.39
38	3.51
39	3.14
	3.35

Probably variable.

β Libræ.

14	3.15
26	3.06
45	2.99
	3.07

β Lupi.

5	2.90
6	3.21
10	3.22
11	3.00
12	3.02
14	3.39
26	3.16
42	3.22
	3.14

β Muscæ.

6	3.63
14	3.82
25	3.60
35	3.52
38	3.81
42	3.66
43	3.60
	3.67

β Normæ.

23	4.68

β Octantis.

17	4.50

β Pavonis.

17	3.91
27	4.01
	* 3.96

β Pegasi.

16	2.78

β Phœnicis.

3	3.54
21	3.84
30	4.01
	3.80

β Pictoris.

36	4.23

β Reticuli.

6	4.39
21	4.52
30	4.58
35	4.56
37	4.58
	4.53

β Scorpii.

1	2.98
26	2.88
42	3.02
	2.96

β Serpentis.

26	4.00

β Tauri.

39	2.20
45	2.48
	2.34

β Toucani.

3	3.81
21	4.04
30	4.15
	4.00

β Triang.

6	3.30
14	3.55
23	3.50
42	3.55
43	3.40
	3.46

β Tubi.

2	* 3.76

β Ursæ.

45	2.78
46	2.76
	2.77

β Ursæ Min.

46	2.46

Variable.

β Virginis.

41	4.14

β Volantis.

9	4.51
21	4.51
30	4.68
36	4.51
	4.57

γ Apodis.

8	4.82

γ Aquilæ.

17	3.41
27	2.73
	3.07

Very doubtful.

γ Aræ.

42	3.82

γ Argus.

5	2.06
6	2.11
7	2.11
13	2.11
19	2.22
21	2.13
22	1.92
23	2.01
24	2.01
25	2.01
32	2.11
33	2.10

34	2.04
35	2.25
36	2.09
38	1.91
39	2.16
40	2.01
41	2.11
42	2.11
43	2.01
44	2.17
	2.08

γ Bootis.

45	3.40
46	3.36
	* 3.38

γ Canis.

19	3.72+
39	4.81+
41	4.58
	* 4.70

Rejecting 3.72+

γ Capricorni.

27	* 3.98

γ Centauri.

5	2.72
6	2.27 ::
7	2.87
10	2.71
11	2.71
12	2.57
13	2.71
14	2.71
22	2.71
23	2.71
38	2.82
41	2.72
42	2.71
43	2.62
	2.68

γ Ceti.

30	4.24

γ Chamæl.

9	4.65
38	4.73
43	4.91+
	* 4.76+

γ Coeli.

37	4.92

γ Columbæ.

37	4.91

γ Corvi.

7	2.70
14	2.91
22	2.86
23	2.90
35	2.97
42	2.90
43	2.96
45	3.02
46	2.90
	2.90

γ Crateris.

35	* 4.62

γ Crucis.

5	1.72
6	1.72
7	1.72
13	1.72
22	2.30
33	1.86
34	1.72
36	1.72
38	1.72
39	1.72
41	1.72
42	1.72
43	1.72
	1.73

Rejecting 2.30.

γ Doradûs.

21	4.87
30	4.83
37	4.87
	4.86

γ Eridani.

28	3.93
31	3.95
	* 3.94

γ Geminor.

7	2.40
19	2.52
36	2.50
39	2.50
43	2.62
46	2.50
	2.51

γ Gruis.

16	3.65
17	3.57
21	3.70
27	3.44 :
30	3.94 :
	3.66

γ Hydræ.

14	3.28
42	3.52
43	3.57
	3.46

γ Hydri.

3	3.75
6	3.75
16	3.75
17	3.68
21	3.60
30	3.77
35	3.77
36	3.70
37	3.75
38	3.70
39	3.75
	3.72

γ Leonis.

4	2.42
7	1.95
38	2.53
40	2.36
43	2.42
45	2.42
46	2.29
	2.34

Rejecting 1.95.

γ Leporis.

20	4.12
32	3.87
	* 4.00

γ Libræ.

26	** 4.44

γ Lupi.

5	3.20
6	3.38
10	3.38
11	3.38
12	3.38
14	3.45
26	3.38
42	3.36
	3.36

γ Muscæ.

14	4.66
38	4.70
43	4.64
	4.67

γ Orionis.

7	2.08
19	1.92
20	1.77
21	2.31
32	2.42
33	2.42
34	1.97
35	1.99
36	2.09
38	2.23
43	1.90
	2.10

Variable ?

γ Pavonis.

17	4.62
27	3.56
	* 4.09

Very doubtful or variable.

γ Pegasi.

16	3.05

γ Phœnicis.

3	3.61
21	3.90
30	4.10
	3.87

γ Pictoris.

34	4.95

γ Reticuli.

30	4.98
37	4.91
	4.95

γ Sagittar.

2	* 3.58

γ Scorpii.

26	3.98

γ Serpentis.

26	** 4.36

γ Toucani.

21	4.44
30	4.43
	4.44

γ Trianguli.

6	3.52
14	3.50
23	3.52
42	3.48
43	3.52
	3.51

γ Tubi.

1	3.62
2	3.82
42	3.70
	* 3.71

γ Ursæ.

45	2.62
46	2.80
	2.71

γ Virginis.

7	3.05
14	3.08
22	2.95
23	3.11
25	3.45
38	3.00
42	2.93
45	3.17
46	2.97
	3.08

γ Volantis.

6	4.62+
21	4.28
30	4.37
34	4.50
35	4.37
36	4.28
37	4.35
38	4.28
39	4.28
41	4.28
43	4.28
	4.35

δ 2 Apodis.

43	4.64

δ Aquarii.

27	3.79
31	3.80
	3.80

δ Aquilæ.

18	3.64

δ Argus.

5	2.44
6	2.44
7	2.58
13	2.44
21	2.44
34	2.35
35	2.29
36	2.44
37	2.44
38	2.34
39	2.40
41	2.44
42	2.44
43	2.44
	2.42

δ Bootis.

45	3.70

δ Canis.

7	2.34
19	2.35
20	2.40
21	2.13
32	2.34
33	2.16
34	2.26
35	2.45
36	2.32
37	2.30
38	2.27
39	2.26
40	2.50
41	2.34
43	2.34
	2.32

δ Capricorni.

27	3.20

δ Centauri.

5	2.96
6	2.92
13	3.00
14	3.00
22	2.95
38	2.92
41	3.10
42	3.10
43	3.00
	2.99

δ Ceti.

30	4.71

δ Chamæl.

8	4.88
38	4.75
43	4.55
	4.73

δ 2 Columbæ.

37	4.97

δ Corvi.

7	3.20
14	3.25
22	3.15
23	3.11
35	3.25
42	3.40
43	3.11
45	3.25
46	3.25
	3.22

δ Crateris.

35	3.80
41	3.86
42	3.85
	3.84

δ Crucis.

6	3.58
14	3.31
22	3.60
23	3.60
34	3.60
35	3.62
38	3.67
41	3.60
42	3.46
43	3.67
	3.57

δ Doradûs.

21	4.90
30	4.92
34	4.85
	4.89

δ Eridani.

28	4.37
29	4.33
31	4.26
	** 4.32

δ 1 Gruis.

3	4.30

δ 2 Gruis.

3	4.36

δ Horolog.

37	4.95

δ Hydræ.

35	* 4.66

δ Hydri.

3	4.48
21	4.60
30	4.29
37	4.43
	4.45

δ Leonis.

7	2.95
45	2.96
46	2.85
	2.92

δ Leporis.

20	4.15

δ Lupi.

10	3.95
11	3.93
12	3.93
14	3.85
26	3.95
42	4.03
	3.94

δ Muscæ.

6	4.62+
8	4.79−
Mean	4.71
14	4.60
38	4.67
43	4.40
	* 4.60

δ Ophiuchi.

26	3.00

δ Orionis.

7	2.30
19	2.55
20	2.74
21	2.65
32	2.79
43	2.62
	2.61

δ Pavonis.

17	4.00

δ Phœnicis.

3	3.92
21	4.18
30	4.75
	4.28

Doubtful.

δ Reticuli.

30	5.02+
37	4.96
	* 4.99+

δ Sagittar.

2	2.99
17	3.35
18	2.99
	* 3.11

δ Scorpii.

1	2.86
15	2.86
26	2.84
42	2.86
	2.86

δ Serpentis.

26	** 4.14

δ Toucani.

30	4.62

δ Virginis.

23	3.90

δ Volantis.

21	4.54
30	4.56
34	4.69
43	4.64
	4.59

ε Argus.

5	2.17
6	2.17
7	2.17
13	2.17
21	2.21
33	2.27
34	2.17
36	2.17
38	2.10
39	2.08
40	2.17
41	2.23
42	2.30
43	2.17
44	2.17
	2.18

ε Bootis.

45	2.70
46	2.72
	2.71

ε Canis.

7	1.89
19	1.89
20	1.77
21	1.77
25	1.89
32	1.89
33	1.74
34	1.88
35	1.99
36	1.77
37	1.89
38	1.75
39	1.89
41	1.89
43	1.94
44	1.89
	1.86

ε Centauri.

5	2.83
6	2.83
10	2.83
11	2.81
12	2.82
13	2.80
14	2.80
22	2.86
42	2.80
43	2.84
	2.82

ε Ceti.

28	* 4.87

ε Chamæl.

8	4.91+
38	4.76
43	4.91+
	* 4.86+

ε Columbæ.

37	4.39

ε Corvi.

14	3.22
22	3.31
23	3.31
25	3.31
35	3.48
38	3.00
42	3.16
43	3.40
45	3.31
46	3.31
	3.28

ε Crucis.

6	4.60
14	4.60
22	4.60
23	4.60
35	4.60
38	4.60
43	4.64
	4.61

ε Doradûs.

21	4.96
30	4.96
34	4.96
	4.96

ε Eridani.

28	4.46
31	4.34
	* 4.40

ε Gruis.

3	3.33 ?
21	3.98
27	3.88
30	4.05
	3.97

Rejecting 3.33

ε Hydræ.

35	3.72

ε Hydri.

3	4.42
21	4.58
30	4.29
37	4.48
	4.44

ε Leonis.

45	* 3.43

ε Leporis.

20	3.85
37	3.84
	3.84

ε Lupi.

10	4.02
11	4.05
12	4.05
14	3.89
26	4.02
42	3.99
	4.00

ε Ophiuchi.

26	4.00

ε Orionis.

7	2.00
19	1.97
20	1.89
21	1.89
32	1.77
33	1.40
34	1.88
35	1.77
36	1.89
38	1.85
39	1.77
43	1.90
	1.84

ε Pavonis.

17	* 4.33

ε Pegasi.

16	2.51
27	2.62
	2.56

ε Phœnicis.

3	3.97
21	4.36
30	4.50
	4.28

ε Reticuli.

21	4.95
30	5.02+
37	4.95
	* 4.97+

ε Sagittarii.

2	2.27
15	2.23
16	2.26
18	2.28
	2.26

ε Scorpii.

1	2.78
2	2.58
42	2.78
	2.71

ε Serpentis.

26	** 4.27

ε Toucani.

3	4.96
21	4.70
30	4.97
	4.88

ε Ursæ.	
44	1.97
45	1.79
	1.88

ε Virginis.	
45	3.11

ε Volantis.	
21	4.84
30	4.85
34	4.90
36	4.82
	4.85

ζ Aquilæ.	
18	* * 3.45

ζ Argus.	
5	2.74
6	2.74
19	2.75
20	2.67
24	2.74
25	2.74
32	2.74
33	2.74
36	2.69
37	2.74
38	2.66
39	2.66
41	2.74
43	2.74
	2.72

ζ Canis.	
19	3.65
20	3.69
21	3.66
27	3.40
37	3.69
39	3.69
	3.63

ζ Centauri.	
5	2.96
6	2.94
10	2.91
11	3.02
12	3.18
13	2.88
14	2.88
22	3.04
26	2.80
42	2.88
43	3.11
	2.96

ζ Ceti.	
28	* 4.86

ζ Crucis.	
9	4.56
38	4.87
	4.71

ζ Doradûs.	
21	4.93
36	4.95+
	* 4.94+

ζ Gruis.	
3	4.19

ζ Hydræ.	
35	3.44
37	3.71
43	3.21
	3.45

ζ Hydri.	
3	5.02
21	4.92
30	5.02
37	5.02
	5.00

ζ Leporis.	
20	3.99

ζ Lupi.	
6	4.44
10	4.07
11	4.00
12	4.01
14	4.05
42	4.07
	4.11

ζ Ophiuchi.	
26	2.97

ζ Orionis.	
7	2.09
19	2.16
20	2.13
21	1.97
32	2.04
33	1.95
34	1.88
35	1.99
36	1.97
38	1.98
39	1.99
43	1.97
	2.01

ζ Pavonis.	
17	4.56

ζ Phœnicis.	
3	4.03
30	4.47
	4.25

ζ Sagittar.	
2	2.79
17	3.24
	3.01

ζ 2 Scorpii.	
42	4.34

ζ Toucani.	
3	4.62
21	4.62
30	4.90
	4.71

ζ Ursæ.	
45	2.45
46	2.54
	2.50

ζ Virginis.	
23	3.70
26	4.06
	3.88

ζ Volantis.	
21	4.73
30	4.73
34	4.60
36	4.73
39	4.73
	4.71

η Bootis.	
26	3.04
45	3.08
	3.06

η Canis.	
19	2.96
20	2.84
32	2.84
36	2.80
38	2.88
39	2.82
41	2.84
43	2.83
	2.85

η Centauri.	
5	2.96
6	2.93
10	2.88
11	2.91
12	2.91
13	2.91
14	2.90
26	2.91
42	2.91
	2.91

η Ceti.	
28	4.03
31	4.09
	* 4.06

η Crucis.	
9	4.60

η Eridani.	
28	4.63
31	4.38
	* 4.50

η Hydræ.	
35	* 4.67

η Leporis.	
20	4.09

η Lupi.	
11	4.10
12	4.10
23	4.10
	4.10

η Ophiuchi.	
26	2.89

η Orionis.	
20	3.92

η Phœnicis.	
3	4.55
30	4.78
	4.66

η Scorpii.	
42	3.80

η Serpentis.	
18	* * 3.51

η Toucani.	
3	5.02
30	5.00
	5.01

η Ursæ.	
45	2.13

η Virginis.	
23	4.00
42	4.62+
	4.31+

θ Aquilæ.	
18	* * 3.57

θ Argus.	
6	3.42
14	3.34
38	3.22
42	3.00
43	3.31
	3.26

θ Canis.	
39	4.81+
41	4.55
	* 4.68+

θ Centauri.	
5	2.55
6	2.55
7	2.45
10	2.55
11	2.55
12	2.70
13	2.55
14	2.55
22	2.55
26	2.55
40	2.42
42	2.55
45	2.55
	2.54

θ 1 Ceti.	
28	* 4.33

θ Chamæl.	
8	4.91
21	4.91
38	4.91
43	4.91
	4.91

θ Columbæ.	
37	4.98

θ Doradûs.	
34	4.94

θ Eridani.	
21	3.73
28	3.73
30	3.73
37	3.73
	3.73

θ Gruis.	
3	4.25

θ Libræ.	
26	* * 4.63

θ Phœnicis.	
3	4.82

θ Scorpii.	
1	2.28
2	2.27
6	2.37
15	2.32
16	2.28
18	2.26
26	2.28
42	2.28
	2.29

ι Argûs.	
5	2.72
6	2.73
13	2.73
14	2.73
36	3.00
38	2.95
39	2.90
42	2.72
43	2.73
	2.80

ι Centauri.	
5	3.23
6	3.23
10	3.21
11	3.02
12	3.18
14	3.08
22	3.45
42	3.16
45	3.22
	3.20

ι Eridani.	
30	4.60

ι Gruis.	
3	3.47 ?
21	4.48
	3.97
Very doubtful.	

ι Hydræ.	
35	4.63
36	4.17
41	4.38
	4.39

ι Leonis.	
46	4.22

ι Leporis.	
37	4.88

ι Lupi.	
6	4.23
10	4.29
12	4.17
42	3.95
	4.16

ι Orionis.	
19	3.58
20	3.30
32	3.30
39	3.32
	3.37

ι Phœnicis.	
3	4.75

ι Pisc. Aust.	
3	4.69

ι Scorpii.	
1	3.45
42	3.61
	3.53

ι Reticuli.	
30	5.02+
37	5.01
	* 5.01+

ι Virginis.	
26	** 4.48

κ Argûs.	
5	2.96
6	3.04
14	3.04
36	2.85
38	2.82
39	2.75
42	2.98
43	3.04
	2.94

κ 2 Canis.	
25	4.04
39	4.28
	4.16

κ Centauri.	
5	3.24
6	3.47
10	3.66
11	3.66
12	3.66
14	3.79
42	3.67
	3.60

κ Columbæ.	
25	* 4.91

κ Eridani.	
3	4.14
21	4.33
30	4.65
37	4.83
	4.51

κ Leporis.	
37	4.88

κ Lupi.	
10	4.40
12	4.32
14	4.61
26	3.96
	4.32

κ Ophiuchi.	
26	3.97

κ Orionis.	
7	2.52
19	2.66
· 20	2.59
21	2.59
30	2.58
32	2.59
33	2.59
35	2.59
36	2.60
	2.59

κ Phœnicis.	
3	4.08
21	4.40
30	4.81
	4.43
Doubtful.	

κ Scorpii.	
1	2.86
2	2.79
26	2.93
42	3.07
	2.91

κ Virginis.	
26	** 4.56

λ Aquilæ.	
18	** 3.57

λ Argûs.	
6	2.32
13	2.48
24	2.48
34	2.48
36	2.48
37	2.48
38	2.48
41	2.48
42	2.48
43	2.48
	2.46

λ Bootis.	
45	4.26

λ Canis.	
25	4.16

λ Centauri.	
6	3.84
14	3.59
38	3.80
42	3.64
	3.70

λ Eridani.	
37	4.97

λ Gruis.	
3	4.89

λ 2 Hydræ.	
35	4.18
41	4.24
43	4.18
	4.20

λ Leporis.	
37	4.90

λ Lupi.	
11	4.76
26	4.59
	4.67

λ Ophiuchi.	
26	** 4.32

λ Orionis.	
201	4.05

λ Phœnicis.	
3	5.02+
30	4.99
	* 5.00+

λ Sagittar.	
2	3.13

λ Scorpii.	
1	1.78
6	2.20
15	1.61
16	1.95
18	1.97
42	1.86
	1.87

λ Virginis.	
26	** 4.63

μ Argûs.	
6	3.13
14	2.86
25	3.10
35	3.23
36	3.08
38	3.08
41	3.06
42	3.04
43	3.11
	3.08

μ Centauri.	
6	3.92
10	3.92
11	3.93
12	3.93
14	4.09
34	3.93
35	3.88
42	3.91
	3.93

μ Ceti.	
31	* 4.59

μ Columbæ.	
37	5.01

μ Eridani.	
20	4.19
37	4.65
	4.42

μ Hydræ.	
35	4.61
41	4.35
	* 4.48

μ Leporis.	
20	3.92
37	3.87
	3.90

μ Lupi.	
11	4.27
12	4.47
	4.37

μ Phœnicis.	
3	* 5.02

μ 1 Scorpii.	
1	3.98
42	3.37
	** 3.67

μ 2 Scorpii.	
1	** 4.16

μ Serpentis.	
26	3.99

μ Ursæ.	
45	* 3.35

μ Virginis.	
26	** 4.40

ν Argûs.	
20	3.82
21	3.68
24	3.26
25	3.73
36	3.73
43	3.72
	3.74
Rejecting 3.26	

ν 2 Canis.	
39	4.75

ν Centauri.	
6	3.93
10	3.93
11	3.93
12	3.93
14	4.15
34	3.92
35	3.97
42	3.88
	3.95

ν Doradûs.	
34	4.94

ν 2 Eridani.	
20	4.02
37	4.50
	4.26

ν Hydræ.	
22	3.31
35	3.69
36	3.76
41	3.58
43	3.67
	3.60

ν Octantis.
17 * 4.11

ν Scorpii.
1 4.58 ?
42 3.42
** 4.00
Very doubtful.

ν Tauri.
31 * 4.40

ξ Argûs.
20 3.72
25 3.77
41 3.74
3.74

ξ 2 Centauri.
34 4.77

ξ 2 Ceti.
31 * 4.49

ξ Hydræ.
23 4.15
41 3.95
4.05

ξ Horolog.
21 5.00
30 5.00
5.00

ξ Scorpii.
26 ** 4.63

ξ Tauri.
31 * 4.36

ξ Ursæ.
45 * 4.20

ο Argûs.
36 3.99

ο 1 Canis.
25 4.30
39 4.43
4.36

ο 2 Canis.
19 3.72
20 3.76
25 3.70
38 3.79
39 3.77
41 3.76
3.75

ο Tauri.
31 * 4.52

π Argûs.
20 3.10
24 2.96
25 2.90
32 2.96
36 2.93
38 3.18
41 2.96
43 2.89
2.98

π Ceti.
28 4.67
31 4.45
* 4.56

π Hydræ.
14 3.70
42 3.79
3.75

π Lupi.
10 4.51
11 4.67
12 4.40
** 4.53

π Ophiuchi.
18 ** 3.05

π Sagittarii.
2 3.27
17 3.52
3.40

π Scorpii.
1 3.37
26 3.38
42 3.30
3.35

ρ Argûs.
19 3.32
25 3.52
41 3.34
43 3.11
3.32

ρ Centauri.
23 * 4.63

ρ Ceti.
28 * 4.87

ρ Lupi.
11 4.88
34 4.72
** 4.80

ρ Scorpii.
1 4.42
26 4.52
** 4.47

σ Argûs.
20 3.79
24 3.79
25 3.79
32 3.79
36 3.79
37 3.79
43 3.79
3.79

σ Canis.
25 3.79
39 4.06
3.92

σ Centauri.
34 4.96+
38 4.66
* 4.81+

σ Eridani.
31 4.42

σ Sagittarii.
2 2.58
15 2.36
16 2.38
18 2.38
27 2.38
2.41

σ Scorpii.
1 3.45
23 3.38
26 3.38
42 3.77
3.50

τ Argûs.
6 3.55
21 3.50
24 3.55
25 3.66
32 3.55
35 3.36
36 3.36
3.50

τ Ceti.
28 * 4.28

τ 1 Eridani.
28 4.86
31 4.57
* 4.71

τ Hydri.
37 * 5.01

τ Orionis.
20 4.25

τ Scorpii.
1 3.45
23 3.45
26 3.38
42 3.46
3.44

υ Argûs.
6 3.66
14 3.50
36 3.16
38 3.61
39 3.58
41 3.58
42 3.58
43 3.58
3.53

υ 1 Centauri.
11 4.34
12 4.55
34 4.91
4.60

υ 1 Hydræ.
35 4.64
41 4.52
4.58

υ Pictoris.
25 4.32
37 4.79
4.54

υ Scorpii.
1 3.37

φ Argûs.
6 4.32
25 4.34
4.33

φ Centauri.
6 4.62
12 4.62
34 4.30
42 4.62
4.54
Sequences 10, 11, 14 are allowed no influence.

φ Eridani.
3 3.68
21 3.94
30 4.20
37 4.07
4.00

φ Leonis.
41 4.72

φ 1 Lupi.
10 4.18
11 4.10
12 4.25
4.18

φ Phœnicis.
3 * 5.02

φ Sagittarii.
2 3.71
17 3.83
* 3.77

ψ Argûs.
25 4.35
37 4.28
38 4.35
41 4.35
43 4.18
4.30

ψ Centauri.
11 ** 4.84

ψ Eridani.
37 4.99

ψ Ursæ.
45 3.33
46 3.40
3.36

χ Argûs.
6 4.03
36 3.93
38 4.05
39 4.06
41 4.05
43 4.05
4.03

χ Eridani.
3 3.86
21 4.09
30 4.33
4.09

ω Argûs.
6 3.80
14 3.66
36 3.25
38 3.83
39 3.85
41 3.83
42 3.83
3.72

ω Canis.
25 * 4.93

ω 1 Scorpii.
1 ** 4.50

a Carinæ.
6 4.62+
36 4.05
* 4.33+

a Centauri.
11 * * 4.86

a Mali.
25 4.33
36 4.11
38 4.64
41 4.38
43 4.60
4.41

a Puppis.
6 4.31
25 4.31
4.31

a Velorum.
36 4.86

b Centauri.
11 * * 4.73

b Mali.
25 4.81
36 4.81
39 4.81
41 4.81
43 4.81
4.81

b Velorum.
36 4.89

c 3 Aquarii.
31 * 4.30

c 1 Centauri.
11 4.75

c Mali.
25 4.81
41 4.62
43 4.91+
* 4.78+

c Puppis.
25 3.91

d Centauri.
11 4.70
34 4.92
* * 4.81

d Eridani.
31 * 4.55

d Scorpii.
26 4.10

e Eridani.
37 4.89

f Centauri.
34 4.81

f Eridani.
30 5.01
37 4.69
4.85

f Sextantis.
41 4.66

g Centauri.
11 * * 4.78

g Eridani.
28 4.81
37 4.53
* 4.67

h Eridani.
37 4.89

i Centauri.
11 * * 4.82

k Centauri.
11 * * 4.80

k Puppis.
20 4.29
41 4.29
4.29

l Carinæ.
6 4.13
38 4.63
4.38

l 1 Eridani.
28 * 4.88

l 2 Eridani.
28 * 4.89

m 1 Eridani.
28 4.85
31 4.51
* 4.68

n Centauri.
34 4.93

o Scorpii.
26 4.19

p Carinæ.
6 3.85
14 3.96
38 4.61
3.90
Rejecting 4.61.
(Full moon.)

p Puppis.
25 * 4.96

p Sceptri.
37 4.62

p Velorum.
25 4.50

q Carinæ.
6 3.86
14 3.99
38 3.73
39 3.76
41 3.76
42 3.76
3.81

q Monocer.
41 4.41

q Orionis.
20 3.51

q Velorum.
25 4.65
36 4.92
41 4.48
* 4.68

r Lyncis.
45 * 3.38

r Orionis.
20 3.89

r Sceptri.
37 4.93

s 2 Eridani.
(16 Fl.)
28 4.59
31 4.28
* 4.43

t Eridani.
28 4.74
31 4.53
* 4.63

u Carinæ.
38 4.51

x Carinæ.
38 4.83

y Eridani.
37 4.89

z 1 Centauri.
41 4.78

z Orionis.
20 3.95

z Virginis.
26 * * 4.23

B Carinæ.
34 4.95

C Carinæ.
34 4.95

E Eridani.
28 4.78
31 4.47
* 4.62

I Carinæ.
38 4.69

L Puppis.
20 4.22

N Velorum.
6 3.70
14 3.62
38 3.60
42 3.50
3.60

O Crucis.
14 4.61

V Centauri.
34 4.90

Y Eridani.
37 4.75

3 Fl. Argus.
41 4.44

10 Fl. Tauri.
31 * 4.43

B A C. 956.
21 5.03

B A C. 1103.
21 5.00
30 4.99
5.00

B A C. 2562.
25 4.32

B A C. 3984.
6 4.62+
38 4.43
* 4.52+

(256) It will not be uninteresting if we now compare the values thus directly deduced from the observed sequences, with the provisional magnitudes assigned in our normal sequence B from which they have originated. For this purpose, confining ourselves in the first instance to the stars of that sequence which are printed in italics, and which occur in the original normal sequence A, 118 in number, and comparing their magnitudes in B and C seriatim, we find the following distribution of the amounts of discordance between the two series exclusive of stars of the first magnitude brighter than Regulus:—

Cases of exact agreement, ...	22
Cases of disagreement under one-twentieth of a magnitude, ...	64
Disagreements of one-twentieth, but under one-tenth of do.	26
Do. one-tenth, but under one-eighth of do.	6
	118

In no instance then, among *these* stars, does the magnitude finally resulting differ from that provisionally adopted to the extent of one-eighth of a magnitude.

(257) If we next compare, in the same manner, the remaining stars of the list B, 142 in number, we find as follows:—

Cases of exact agreement, ...	9
Disagreements under one-twentieth of a magnitude, ...	53
Do. of one-twentieth, but under one-tenth of do.	31
Do. of one-tenth, but under one-fifth of do.	37
Do. of one-fifth, but under one-third of do.	10
Do. of one-third, but under one-half do.	2
	142

Thus we see that there are only 12 cases of discordance, to the extent of one-fifth of a magnitude, between the provisional and adopted magnitudes out of the whole number of 260 stars compared, —and these are no more than might reasonably be expected,—when it is recollected that the list B contains numerous stars which had been struck out of A not merely for want of connexion, but on account of actual discordances between the corrected sequences, of the kind alluded to in Art. (234). The two worst cases, in which the discordance amounts to 0.40 and 0.41 respectively, are those of η Virginis and γ Aquilæ. In both cases the discordance arises from widely deviating observations being included in the final mean, which had no share in determining the provisional value.

(258) Several of the stars in Table C are marked as variable, or possibly so. Two of the most remarkable are α Hydræ and β Ursæ Minoris. As regards α Hydræ, in December 1837, and January, February, and March 1838, it was made the subject of frequent comparisons with ϵ Argus, δ Canis, and δ Argus, the first of which stars (Mag. 2.18) it equalled at its maximum, the second (2.32) in its medium state, and the last (2.42) at its minimum, with a period of about twenty-nine or thirty days. At the time I regarded the observations as satisfactory, and the result as sufficiently established: but the occurrence of a similar phenomenon, with a period nearly identical in the case of α Cassiopeiæ, the period in both cases being nearly a lunation, inclines me to distrust both conclusions, and to believe that the colour of the stars (in both cases

verging to redness) has affected the judgment in the presence of moonlight differently from that of the stars of comparison. Such at least is undoubtedly the case with α as compared with γ Cassiopeiæ, a white star. ϵ and δ Argus are both red, however, but even in their cases a difference in their proximity to the moon might influence the observation.

(259) The case of β Ursæ Minoris, however, admits of no doubt being raised on this score. It is now, while I write (May 14, 1846), so far inferior to Polaris in the absence of the moon, and at a higher altitude, that no observer, however unpractised, could hesitate as to their relative rank. The reverse was the case in 1840 and 1841, in the former of which years I find β placed uniformly above α (Polaris) in ten sequences observed on Jan. 2, 5; April 30; May 1, 3; Aug. 3, 4, 5, 23; and Nov. 27, while in the latter of these years, the same order of precedence obtained, and was so recorded on the 19th and 20th of August, and in one undated sequence between July 16 and Aug. 18. The difference of brightness on May 3, 1841, is called "one step," and on Aug. 23 "at least a grade," intending by these expressions a difference sufficiently palpable to admit of no hesitation.

(260) In 1838 and 1839, the difference seems to have been somewhat less striking. On Jan. 16, 1839, I find it recorded that β surpassed α by a "small grade." In the sequence (No. 46, of April 15, 1838), the difference as concluded from the interpolated magnitudes was only 0.13 mag. In that observation, Polaris was only 18° high, and β considerably more elevated, and it may therefore be presumed that the stars were then not far from equality. In corroboration of this, I shall take the liberty of translating a passage from a letter addressed to me by M. Struve on the 5th Dec. 1838, in effect as follows: "I would call your attention to two stars. Has not Capella been during several years in a state of increase?* and, again, α Ursæ Minoris (Polaris) is ordinarily decidedly brighter (and, indeed, not inconsiderably so) than β Urs. Min.; but at present the difference is scarcely perceptible, and I have more than once seen β almost brighter than α." That the change has taken place in β and not in α, is, I think, certain, having no reason either from general impression, or from comparison with other stars, to suspect a change to any sensible extent in the latter.†

(261) Future observation will decide whether the change which is thus proved to have taken place be of periodical recurrence. The complete period, if such be the case, and supposing the star to be now at its minimum of lustre, can hardly be shorter than ten years, which is still inferior to that of some stars supposed to be regularly variable. Ignorant as we are, however, both of the cause of solar and stellar light, and of the conditions which may influence its amount at different times, the law of regular periodicity is one which ought not to be too hastily generalized, and at all events there is evidence enough of slow and gradual change of lustre in many stars, since the earlier ages of astronomy, to refute all *a priori* assumption as to the possible length of the cycle of variation of any particular star. The subject is one of the utmost physical

* I entirely agree with M. Struve in this surmise. Within my own distinct recollection, I always considered Capella inferior to Lyra, whereas it is now certainly superior.

† Since this was written, the inequality between α and β Ursæ Minoris has greatly diminished. Already, on the 15th June, β had so far recovered as to be declared nearly equal to α, and on several occasions since (July 1846), though still somewhat less, it has been found not easy at once to say which is the brighter. η Ursæ Majoris is now certainly by far the brightest of the seven bright stars in that constellation, whereas in 1838 ϵ held that rank quite as indisputably.

interest. The grand phenomena of geology afford, as it appears to me, the highest presumptive evidence of changes in the *general* climate of our globe. I cannot otherwise understand alternations of heat and cold, so extensive as at one epoch to have clothed high northern latitudes with a more than tropical luxuriance of vegetation; at another, to have buried vast tracts of middle Europe, now enjoying a genial climate, and smiling with fertility, under a glacier crust of enormous thickness. Such changes seem to point to some cause more powerful than the mere local distribution of land and water (according to Mr. Lyell's views), can well be supposed to have been.* In the slow secular variations of our supply of light and heat from the sun, which in the immensity of time past may have gone to any extent, and succeeded each other in any order, without violating the analogy of sidereal phenomena which we know to have taken place, we have a cause, not indeed established as a fact, but readily admissible as something beyond a bare possibility, fully adequate to the utmost requirements of geology.† A change of half a magnitude in the lustre of the sun, regarded as a fixed star, spread over successive geological epochs,—now progressive, now receding, now stationary, according to the evidence of warmer or colder *general* temperature which geological research has disclosed, or may hereafter reveal,—is what no astronomer would now hesitate to admit as in itself a perfectly reasonable and not improbable supposition. Such a supposition has, assuredly, far less of extravagance about it than the idea that the sun, by its own proper motion, may, in indefinite ages past, have traversed regions so crowded with stars as to affect the climate of our planet by the influence of *their* radiation. Nor can it be objected that the character of a *vera causa* is wanting in such an hypothesis. Of the exciting cause of the radiant emanations from the sun and stars, we know nothing. It may consist, for aught we can tell, in vast currents of electricity traversing space (according to cosmical laws), and which, meeting in the higher regions of their atmospheres with matter properly attenuated, and otherwise disposed to electric phosphorescence, may render such matter radiant, after the manner of our own aurora borealis, under the influence of terrestrial electric streams.‡ Or it may result from actual combustion going on in the higher regions of their atmospheres, the elements of which, so united, may be in a constant course of separation and restoration to their active state of mutual combustibility, by vital processes of

* A considerably greater elevation of those tracts of Europe which bear the marks of glacier action in former ages than at present, might suffice (especially if aided by a favouring distribution of land and sea generally) to account for a local prevalence of *cold* to any required extent. It is the demand for not merely a mild but a hot climate, and the absence of winter in high latitudes, which causes the misgiving I have ventured to express in the text as to the sufficiency of this most ingenious theory, rejecting all aid from external causes, to account for the whole phenomenon.

† "Many phenomena in natural history seem to point out some past changes in our climates. Perhaps the easiest way of accounting for them may be to surmise that our sun has formerly been sometimes more and sometimes less bright than it is at present."—W. Herschel *on the Changes that happen to the Fixed Stars. Phil. Trans.* 1796, p. 186.

‡ This is not the first time that a possible analogy between the light of the Sun and that of our Aurora Borealis has been suggested. "In our atmosphere, the extent of the clouds is limited to a very narrow compass; but we ought rather to compare the solar ones to the luminous decompositions which take place in our Aurora Borealis, or luminous arches which extend much further than the cloudy regions. The density of the luminous solar clouds .... may not be exceedingly more so than that of our Aurora Borealis; for if we consider what would be the brilliancy of a space two or three thousand miles deep filled with such coruscations as we now and then see in our atmosphere, their apparent intensity, when viewed at the distance of the sun, might not be

extreme activity going on at their habitable surfaces, analogous to that by which vegetation on our earth separates carbonic acid (a product of combustion) into its elements, and so restores their combustibility. With specific hypotheses as to the cause of solar and sidereal light and heat, we have, however, no concern. It suffices that they must have a cause, and that this cause, inscrutable as it may be, does in several cases, and therefore may, in one more, determine the production of phenomena of the kind in question.

(262) To return, however, to our numerical magnitudes. Having obtained by the processes above explained, a series of values, which, while agreeing in general with the scale adopted in the fundamental catalogue, are yet, in each particular instance, assuredly far more correct than in that catalogue, there is no reason why we should not return upon our steps, by employing these more correct values instead of the catalogued values in column 2 of our normal sequence A, and proceeding in precisely the same way as before, deduce from *them* a new progression of equalized values (as in col. 3), and a new series of interpolated magnitudes, as in col. 4. Then, in like manner, step by step, carrying out all the subsequent work, a final series of magnitudes would emerge, *altogether freed from the influence of the accidental errors of the original catalogue.* There is every reason to believe, however, that the corrections so induced upon our series of magnitudes as stated in Table C, would be quite immaterial, for which reason I have not thought it necessary to go through the laborious process of this second approximation. In case, however, of the subject being taken up *de novo*, by the observation of fresh sequences on a more regular and methodical system, for which the way is now clearly chalked out (as I hope earnestly will be the case), it is almost needless to recommend the pursuance of this course in preference to recurring again to the rude and inaccurate magnitudes of catalogues actually in use, as by so doing we start from a more advanced point.

(263) Lastly, it is right to mention, that, so long ago as the year 1841, pursuing a course based upon the same general principles, but less elaborate and less systematic in its details, I had derived from the same observed sequences which are here discussed, a series of magnitudes comprising the great majority of those in Table C. Comparing these with the magnitudes now deduced by an independent and more regular process, I find the results to agree within limits, as follows (stars brighter than Regulus being excluded) :—

Discordances not exceeding one-twentieth of a magnitude, ...	131
Do. above one-twentieth, but not exceeding one-tenth, ...	85
Do. above one-tenth, but not exceeding one-fifth, ...	58
Do. above one-fifth, but not exceeding one-third, ...	29
Exceeding one-third of a magnitude (= 0·35), ...	1
	304

By far the larger number of these discordances are systematic, and depend on a different course assigned in the earlier process to the interpolating curve for the provisional magnitudes, and which further inquiry has convinced me to have been erroneous.

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inferior to that of the lucid solar fluid."—W. Herschel *on the Nature of the Sun and Fixed Stars. Phil. Trans.* 1794, p. 62. It is rather to the quiet reposing masses or clouds of auroral light than to its more vivid coruscations, however, that the analogy seems applicable.

SECTION II.—ACCOUNT OF SOME ATTEMPTS TO COMPARE THE INTENSITIES OF LIGHT OF THE STARS ONE WITH ANOTHER BY THE INTERVENTION OF THE MOON, BY THE AID OF AN ASTROMETER ADAPTED TO THAT PURPOSE.

(264) The process by which these comparisons were made, consists in deflecting the light of the moon by total internal reflection at the base of a prism, so as to emerge in a direction nearly coincident with that of the undeflected light of one of the stars to be compared. It is then received upon a lens of short focus, by which an image of the moon is formed, which, viewed at a considerable distance by an observer placed in or near the axis of the lens, will appear to him as a star. This artificial star is then to be approached to or removed from the eye, until its light is judged to be exactly equal to the light of the real star, which, lying in nearly the same direction from the observer, will be seen side by side with the artificial one with the same eye, or with both eyes at once, without the aid of a telescope* in the ordinary mode of natural vision. The distance from the eye to the focus of the lens being then measured, the prism and lens are to be so placed as to form another similar artificial star, in a direction nearly coincident with that of the other star under comparison; and another equalization being made, and distance measured, it is obvious that the intensities of the lights of the two stars, or at least their effects on the retina, under the circumstances of comparison, will be to each other in the inverse ratio of the squares of the distances so measured respectively. For no light being lost by total internal reflection at the base of a prism, and the light lost at the ingress and egress of the moon's rays into and out of the prism, being at such moderate angles of incidence as it is ever necessary to employ in such comparisons, very nearly, indeed, in an invariable ratio to the total incident light, the artificial star, or lunar image, will be equally luminous in both cases, and its effect on the eye will, therefore, be in the ratio of the square of its apparent angular diameter, or inversely as the square of its distance.

(265) The astrometer, or instrument employed for this purpose in the observations about to be recorded, is of an extremely simple construction. It consists of three principal parts,—an upright pole firmly fixed in the ground, about 20 feet high, which I shall call the *standard;* a cylindrical deal rod about $2\frac{3}{4}$ inches in diameter, and 12 feet long, which may be termed the *staff*, furnished with pulleys at either end let into its thickness, and with two iron pivots prolonging its axis both ways, as presently to be described; and, lastly, a *slider*, consisting of a rectangular piece of deal 15 inches long, $2\frac{3}{4}$ inches broad, and two inches thick, hollowed out at its under surface along its whole length to fit and slide to and fro upon the cylindrical *staff* being retained in contact with it by an iron strap in the middle of its length passing round the staff, but sufficiently loose to admit between them a steel spring fastened to the strap, and keeping up a constant pressure on the surface of the staff most remote from the slider; being so formed as to oppose no impediment to the free motion of the latter either way on the staff, while yet retaining the concave and convex surfaces of the slider and staff in steady contact over the whole extent applied to each other.

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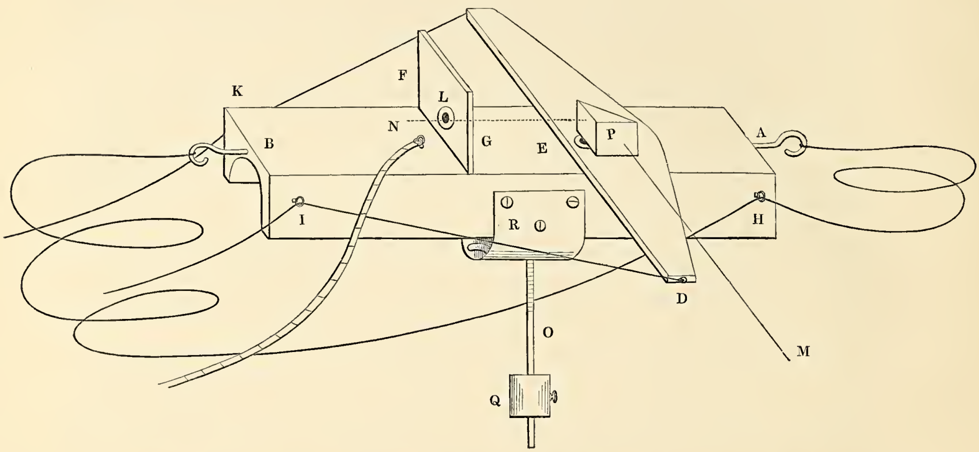
* An opera-glass may occasionally be used with advantage, but was not employed in any of the comparisons here recorded.

(266) The slider carries the prism and lens in the manner represented in the annexed woodcut, where A B is the main body of the slider, drawn to and fro along the staff by a cord attached at its ends to the hooks at A B, and which for that purpose is conducted through the two pulleys let into the two ends of the staff, and also through a small loop, H, at the side of the slider, to prevent its sagging down unnecessarily, being purposely made so long as to be slack when not strained in the act of dragging the slider.



(267) C D is a piece of board resting on the upper or flat surface of the slider, and fastened to it by a pin at E, on which it can turn, as on a pivot, on its own plane: motion being communicated to it for that purpose at pleasure by two strings or reins attached at C and D, and led through loops I K, on either side of the slider to the hand of the observer, wherever he may be stationed, at or near the end of the staff towards B. The pin E is tightened so as to hold the board firmly down on the slider in any position without the possibility of shifting, unless by the action of the reins, which, acting at an advantageous leverage, give it an easy and perfectly regulated motion.

(268) The prism P is of crown glass, isoceles and right-angled. That used was a beautiful specimen of Fraunhofer's glass and workmanship. It is mounted by a brass framing upon the board C D, in the position represented in the figure—its refracting and reflecting surfaces being at right angles to the plane of the board, and the middle of that side of it through which the rays are transmitted out of it to the lens being precisely over the centre of the pivot E, on which the board revolves. Its refractive power is such, that a ray may be diverted as far as $102^\circ\ 43\frac{1}{2}'$ from its original course by reflection at its base (inclusive of the effect of transmission through both surfaces), without surpassing the limits of *total* reflection by actual measure. This gives $\mu = 1.571$ for the refractive index.

(269) F G is a diaphragm sufficiently large entirely to intercept all light from the prism in every position except such as traverses the aperture L of 0.12 inch in diameter, occupied by a lens 0.2253 inch in focal length. By the action of this lens, rays proceeding from the moon at M, reflected internally at the base of the prism, and proceeding out of it towards L, are brought to a focus N, forming there the image of the moon, our artificial star above mentioned. This image is visible to an eye situate anywhere within the diverging cone of rays beyond the focus, and of equal apparent brightness (at equal distances) throughout, except just at the edges of the cone, allowing the observer a very great latitude of motion, and free choice of position in making his comparisons—a matter of great consequence to the success of the observation,—as it permits him, without shifting the apparatus, and by merely varying his own position, to bring the real star nearer to or farther from the artificial one, to the right or to the left of it, above or below it,—without which it is impracticable to judge correctly of their exact equality, by reason of the impurities floating in the aqueous humour of the eyes, and innumerable other causes which influence, in an extraordinary degree (hardly credible without trial), our judgment in such comparisons.

(270) Attached to the iron strap R, which holds the slider by its spring on the staff, and projecting out from it at right angles to the length of the slider on the side opposite to the slider itself, is a short iron rod O, carrying an adjustable counter-weight Q, such as to keep the weight of the slider in equilibrium upon the staff as an axis, and allow the whole slider, with the prism, &c., and the staff together, to rest indifferently in any position with respect to the horizon of the flat face A B, so that when the whole combination is rested on the two iron pivots in the prolongation of the axis of the staff, it shall have no tendency to tilt round, whether the slider be above, below, or lateral, with respect to the staff.

(271) The *standard* has at the top a pivot on which revolves a short iron arm carrying a pulley. Through this pulley passes a cord, one end of which carries a small ring, the other hangs down the standard, and is clewed on belaying pegs at a convenient height on it. Through the ring is passed the iron pivot at the end of the staff, remote from the observer (its upper end), which is there secured from slipping out by an iron knot screwed on. The cord serves by means of this ring to raise the upper end of the staff to any required altitude, allowing it at the same time to turn freely on its axis, so as to admit of the plane C D (which is the plane of reflection of the light within the prism), to be placed at any angle with the horizon.

(272) The lower pivot of the staff rests on and turns freely in an iron socket carried on a portable tripod stand, of the height of the eye, so that when the staff is directed to a star, such star may be viewed conveniently, without either stooping or straining, by an observer standing at the tripod and looking along the staff. To resist the pressure of the staff on the tripod, which might upset it, it is convenient to have a weight ready to hang on below its centre of gravity.

(273) To use this astrometer, a star must be chosen not more than 102° 43′, nor less than 60° or 70° from the moon (which *ought not* to be too near the full, as its light in that case interferes most materially with the comparisons, by enfeebling the impression of the stars). To this star, the staff must be directed, by elevating its upper end by means of the cord and ring, and by moving into a proper situation the tripod-stand carrying its lower pivot. This done, the staff is turned round on its axis till the plane of the board C D passes through the moon and star, and the face P of the prism is towards the moon. Looking, then, along the staff, the reins

attached to C D are worked until the proper angle of reflection is attained, and the artificial star is seen, as it will be, side by side with the real one under comparison. The proper adjustment is attained when a good many degrees motion one way or the other of the prism on its pivot E, and of the staff on its own axis, produce no sensible effect in causing any increase or diminution of the artificial star. The slider is then to be approached to or removed from the eye along the staff, by pulling the line attached to the hooks A B, until a perfect equality between the real and artificial stars is procured.

(274) It only remains to measure the distance of the latter from the eye, which is done by a measuring tape divided into inches, the zero end being attached to a pin in the slider at F, and the inch read off being that which can be brought to contact with the eyelid at a moderate tension of the tape. A sufficient number of such equalizations ought to be made to give confidence in a mean of the readings, and to fix the limits of possible error both in excess and defect, as well as to destroy, by variety of position of the observer's head, and by the alternate judgment of the right, the left, and both eyes (all which are strangely influential), the numerous sources of illusion to which the judgment of equality is subject. This done, the other star must be similarly treated.

(275) The actual comparisons made with this instrument were neither very numerous nor performed under the most favourable circumstances. In several of them the moon was nearly full, and though I had expected this to influence the results when compared with those made at earlier or later periods of the lunation, I was by no means prepared for the enormous extent of that influence. In fact, in the original conception of the process, I had hoped that the image of the moon so formed, as above described, when reduced to that of a mean full moon, by allowing for the phase and apparent diameter, &c., at the time and place of observation, according to an appropriate formula,* would afford a definite standard of light with which any star might be directly and absolutely compared. It is true that, owing to the inequality of illumination of different parts of the moon's disc, the phase would not, strictly speaking, be a numerical measure of the light, but at least in the same phase it would be reducible to a constant standard. But the effect of the illumination of the sky, as will presently be seen, destroys all possibility of obtaining *absolute* results in this manner, and renders it necessary to regard them as comparable only with those taken on the same night and under the same circumstances. All these difficulties and objections would be got over by using Jupiter instead of the moon, and in her absence, as a standard luminary, and properly modifying the apparatus, *which, for this purpose, might be rendered*

* The formula is as follows :—Let Δ represent the moon's *augmented semidiameter*, in seconds, at the place and moment of observation, as given by the Nautical Almanac and a table of augmentations; e her elongation from the sun; R the earth's radius vector, the mean value of R being $= 1$; $933''\cdot5$ the moon's mean apparent diameter. Take

$$M = 1000 \left\{ \frac{\Delta}{R \times 933''\cdot5} \sin \frac{e}{2} \right\}^2$$

then will M express the absolute quantity of light in the moon's image (supposing all her illuminated surface equally bright), and $\frac{M}{d^2}$ the apparent intensity of our artificial star at the distance d from the eye. If great exactness be not required, the correction for augmentation may be neglected (which cannot exceed in its effect $\frac{1}{30}$ of the whole), and instead of e may be taken the difference of longitudes of the sun and moon, at the middle time of the night's comparison.

very convenient and portable, and I regret that this idea did not occur to me when it might have been serviceable. Whenever a definite standard of light is required for photometrical purposes, however, in which the light to be measured can be seen on a perfectly dark ground, the lunar image formed as above described affords one easily available in practice.*

Observations made with the Astrometer above described.

(276) In the following statement of the observations, the first column contains the mean time at Feldhausen. The second, the star compared; the third, the distances at which, in the several comparisons made, the star was declared equal to the lunar image, as also any remarks made at the time. The several series are marked with letters (A, B, C, &c.) for convenience of further reference.

A. March 28, 1836.

Being the first trial of the method.

$e = 129° 29'$ the moon's approximate elongation.
$\Delta = 915''$ her apparent semi-diam. Log R = 9.9996 the Earth's Rad. Vect. Log M = 2.8962.

h. m.			
7 30	α Orionis......	43.7.	Bad obs. Reject.
7 35		49.8.	Better. Colour troublesome.
7 40	Rigel	43.1.	White.
7 49	δ Orionis......	106.2.	
7 55	ε Orionis	92.3.	
7 58	ζ Orionis......	99.9.	
8 2	Rigel	40.0.	Altitude a little greater than ☽'s.
8 7	κ Orionis......	100.8.	
8 50	ι Orionis	127.1.	
8 58	κ Orionis......	95.6.	
9 2		100.5.	Better.
9 5	α Leporis......	108.6.	
9 14	β Leporis......	105.8.	Rejected.
9 17	α Leporis......	97.7.	Rejected.
9 25		85.3.	Rejected.

The star is getting too low, and the scintillation makes the comparison difficult. On examination I find the prism covered with dew. It is clear that the last observations are all vitiated, and probably more. Dismounted the prism, wiped it carefully, and warmed it. After this no more dew. Resumed.

9 50	Sirius	16.7.	Uncertain, too near.
9 55	β Canis	97.3.	
10 2	ε Canis........	74.9.	
10 7	δ Canis	89.7.	

* The use of a prism to deflect the light of a standard luminary by total reflexion at its base, is common to the astrometer described in the text, and that of M. Steinheil; but the idea of so employing it was not borrowed from that ingenious artist. Deflexion through an arbitrary angle, without loss or with trifling and negligible loss of light *variable in amount,* is a necessary condition of the problem of astrometry, and optical science affords no other means of operating such deflexion. My observations were commenced in March 1836. M. Steinheil's Memoir was read, it is true, before the Gottingen Academy in 1835, and printed in 1836, but I had no knowledge of its existence until my return to Europe, when a copy of it was placed in my hands by the kindness of M. Schumacher. The prism used in my observations was one which had been constructed for me by Fraunhofer several years before, with circular faces for the transmission of the incident and reflected rays expressly as a substitute for the oblique metallic mirror in a proposed Newtonian adaptation of the 20-feet reflector; an adaptation defeated in practice by the annoyance of dew, though it gave beautiful images.

I may here mention that a long equilateral prism held in the hands across the eyes is a most convenient aid to naked eye comparisons of stars not very remote from one another; as by looking downwards into its base through the side resting on the nose and forehead, and turning round the upper part of the person in azimuth, the line joining the reflected images may be brought parallel to the horizon and the stars contemplated (with both eyes) in a position of great comfort and advantage. Occasionally, too, it may be used to enfeeble the light of nearly equal bright stars, by *external* reflexion, in an equal ratio (by bringing the line joining their reflected images parallel to that joining their direct). *In this enfeebled state, shades of inequality become apparent which would otherwise escape detection.* By increasing or diminishing (equally) the angles of incidence, the reflected images may be more or less enfeebled. A plain metallic mirror may be used for the same purpose.

h.	m.		
10	15	η Canis	119.7.
10	25	π Argûs	125.5. Went in. When the observations were resumed, the moon was about 20° high.
11	45	ζ Argûs	93.6, 97.5. } Rejected.
11	52	γ Argûs	96.7, 92.3. } Rejected.
12	0	γ Argûs	82.1. Satisfactory. The last observations rejected by reason of flying clouds near the moon.
12	4	λ Argûs	95.0.
12	8	ζ Argûs	108.7. Better. Re-examined 93.6; far too bright.
12	13	δ Argûs	90.4.
12	20	Arcturus	29.8. Moon too low to give probably good results.

B. March 30, 1846.

$e = 154° 34'$; $\Delta = 940''$; Log R = 9.9998.
Log M = 2.9848.

h.	m.		
9	5	Procyon	60.8.
9	18	Jupiter	19.3. Nearly setting behind Table Mountain, at 15° ±.
9	25	Procyon	61.4.
9	34	Sirius	28.8, 26.0. Sky perfectly serene, most superb.
9	45	ε Canis	100.5.
9	52	δ Canis	115.4.
10	12	Spica	81.5.
10	20	Saturn	56.9.
10	32	α Centauri	44.6, 49.2 better.
10	53	β Centauri	59.5.
11	0	Saturn	54.8.
11	12	α Trianguli	96.0 : :, 101.6.
11	26	γ Trianguli	185.6, 188.0. Both rejected.
11	48	β Trianguli	181.1.
12	13	γ Trianguli	179.3. — N.B. β to the eye is a little greater than γ, but the difference is so slight a shade as to be hardly appretiable.
12	48	η Argûs	89.1.
12	57	β Argûs	112.5.
13	5	ι Argûs	146.3.
13	9	ε Argûs	124.5. Rejected. (See below.)
13	10	δ Argûs	132.2.
13	21	κ Argûs	177.5.
13	30	λ Argûs	122.5. A very good match in respect of colour.
13	35	ε Argûs	116.3. Re-examined, 124.5; found too faint.
13	47	υ Argûs	214.0.
13	57	μ Argûs	150.2. Too bright. Rejected.
14	8		155.5. Better. Re-examined.—The moon is beginning to get low. Capital observations. Not a cloud, haze, or vapour, down to the very horizon.
14	18	θ Argûs	173.4. This result is evidently vitiated by the moon's altitude being too low; and repeating it, it came out still too faint, so that it is time to desist. Sky most superb. The moon wants about two days of the full.—N.B. About full moon there is sure to be a cloudless night.

C. March 31, 1836.

$e = 167° 0'$; $\Delta = 952''$; Log R = 9.9999.
Log M = 3.0116.

h.	m.		
9	9	α Centauri	63.8, 61.5.
9	18	β Centauri	100.0, 103.3, 99.5. Affected with a cloud-drift, which came on at $9^h\ 10^m$, and lasted till $9^h\ 25^m$, forming, drifting, and dissolving about the region of the moon.
9	50	β Crucis	117.3, 120.4, 135.0.
—	—	α Crucis	95.0, 94.0. Both rejected.
9	55		110.4. Satisfactory.—The sky is rapidly purifying itself, but all the foregoing results are vitiated.
10	7	α Centauri	62.4.
10	10	β Centauri	96.4, 100.0, 104.6.
10	20	α Crucis	110.0, 112.0 better.
10	23	β Crucis	118, 120, 133, 127.
11	3	α Centauri	64.7.

Pestered with dew, and the back of the prism often dimmed. No value in the results of to-night.

D. April 1, 1836.

$e = 179° 20'$; $\Delta = 959''$; Log R = 0.0001.
Log M = 3.0232.

h.	m.		
9	22	α Centauri	81.2, 82.0.
9	25	β Centauri	122.2, 119.0, 123.5, 123.0, 113.7 was also obtained, but rejected on re-examination as too bright.
9	34	α Centauri	82.0. Clouded from S.E., and cleared again.
9	42	α Crucis	127.0, 127.4.
9	52	β Crucis	150, 152, 150.
10	3	α Centauri	83.0. Rejected 75.0, the cloud now drifting up fast, and the moon becoming veiled, having a double halo.
10	7	α Centauri	81, 85, 80, 83. Clear.
10	33	β Centauri	124.0, 126.5.
10	45	α Crucis	134.3, 130.4, 130.5. Very clear.
10	48	β Crucis	156, 153, 147.
10	52	γ Crucis	166, 160, 163, 162, 163.

Clouded thickly over from S.S.E. as last night, but the cloud is much higher, and there is no moisture. The prism perfectly free from dew.

E. April 3, 1836.

$e = 200° 57'$; $\Delta = 976''$; Log R = 0.0003.
Log M = 3.0234.

Perfectly clear. Strong south wind. Dry thermometer 58°; wet 50°. Very arid cold wind. No dew.

h.	m.		
11	16	α Centauri	61.5, 59, 61.
		β Centauri	94.0, 96. — These measures were taken alternately to insure a more effectual comparison.
11	25	α Centauri	60, 57.5, 62, 60.
		β Centauri	84, 87, 91, 91.5.—Alternate measures taken for a second immediate comparison.

h.	m.		
11	45	β Centauri	84, 93, 87, 87, 86, 89.
		α Centauri	61.0.
		α Crucis	88, 95, 90, 91.—These measures of α Crucis and β Centauri taken alternately, interposing one measure of α Centauri as a fiducial star.
12	10	β Centauri	90, 87, 84, 91.
		α Centauri	60.6.
		α Crucis	94, 97, 97.—The foregoing process repeated, again interposing a fiducial reference to α Centauri.
12	25	β Crucis	120, 115, 123, 117, 122.
		α Crucis	97, 92, 95, 98.—Taken alternately from $12^h 25^m$ to $12^h 33^m$.
12	35	γ Crucis	130, 130, 128.
		β Crucis	118, 117, 117, 122.—Taken alternately, throwing the eye about and never letting it rest on either object, or directing it to a point intermediate between the real and artificial stars. It is the black specks floating in the aqueous humour of the eye, which produce all this confusion.
12	50	η Argûs	107, 114, 108, 109, 113.
		α Crucis	95, 97, 99.—Taken alternately, as above described.
13	5	α Centauri	60, 61, 62.
13	10	α Trianguli	133, 138, 136, 129, 138, 134.—The measure 129 was got by getting the real star between the two images of the artificial one formed by the right and left eyes. 134 was got by a mean of two trials, placing the false star first to the right of the true one, *which always gives it too faint*, then to the left, *which always gives it too bright*. This is perhaps the best way of any.
13	25	α Trianguli	124, 136, 126, 133. These were obtained with the right eye, placing the false star first to the right then to the left of the true alternately.
		α Trianguli	131, 133, 135, 133. These were taken in the same manner in all respects, only using the left eye instead of the right.
13	35	α Muscæ	196. Right eye. 198, 204. Left. With the right eye 178 was first obtained, but proved quite unbearable with the left; and being re-examined with the right was rejected as certainly mistaken.
13	52	α Crucis	95, 93, 91, 95, 93, 98.
		λ Scorpii	127, 129, 131.
		α Crucis	98, 95, 94. Rejected 100.
		λ Scorpii	131, 133, 132, 135.
14	8	θ Scorpii	150, 153, 153, 156, 150.
14	25	ε Sagittarii	153, 153, 155.
14	40	σ Sagittarii	168, 168, 173, 175, 177, 173, 167.
14	45	ε Sagittarii	152, 155.
14	55	α Crucis	92, 92, 96, 97, 90, 96.
15	0	ε Centauri	179, 180, 174, 186.
15	10	γ Centauri	178, 180, 183, 176.

Left off, some cloud flakes beginning to drift up. Wind strong from south, and very cold. Not a trace of dew all night, and everything perfectly dry.

F. April 4, 1836.

e = 221° 24′; Δ = 278″; Log R = 0.0005.
Log M = 2.9815.

h.	m.		
12	15	α Centauri	42, 45, 45, 43, 46. Set to 61. Quite out of the question.
12	28	β Centauri	78, 76, 82, 75.
12	42	α Centauri	44, 43.
12	45	α Crucis	74, 70, 71, 70, 74, 72.
12	52	γ Crucis	111, 109, 107, 105, 112, 109.
13	2	η Argûs	92, 93, 91, 92, 98.
13	14	α Trianguli	130, 131, 128. Rejected 115.
13	17	β Crucis	94, 94, 98, 94, 96.
13	40	Arcturus	54, 53, 56, 57.
13	52	γ Virginis	173, 170, 180, 187, 190. Rejected 193, 197, on re-examination.
14	2	γ Corvi	178, 179, 170, 172, 175.
14	22	δ Corvi	193, 195.
14	42	σ Sagittarii	142. Rejected 154.—So annoyed by wind, and altogether such an unpleasant night, that no good results can be got.
15	7	σ Sagittarii	136, 142, 130, 143. Rejected 151 on re-examination.
15	9	ε Sagittarii	123, 120, 132, 133.
15	17	β Centauri	82, 80, 84.
15	20	α Centauri	42, 42.

Obliged to desist owing to wind and other circumstances unfavourable to good observing. There seem to have been some misreadings as in the case of γ Virginis, and altogether I have little confidence in this series.

G. April 7, 1836.

e = 261° 53′; Δ = 968″; Log R = 0.0009.
Log M = 2.7861.

h.	m.		
14	14	Arcturus	34, 34, 35.
		Spica	44, 50, 43, 48, 48.
		Saturn	42, 43, 43.
		β Centauri	43, 45, 44.
		α Centauri	27± Uncertain.
14	36	α Crucis	43, 44.

H. April 26, 1836.

e = 120° 54′; Δ = 928″; Log R = 0.0031
Log M = 2.8676.

The night beautifully clear and calm.

h.	m.		
7	21	Procyon	56, 54, 56. Rejected 58 on re-examination.
7	34	Sirius	18.5, 17.0, 18.0. Too near to get a sharp image of both objects.
7	36	Procyon	54, 53, 52, 56.
7	46	β Canis	94, 98, 97, 98.
		ε Canis........	86, 84, 89, 88.
8	4	δ Canis	94, 94.
		Spica	68, 73, 74, 72.
		β Corvi	135, 138, 136.
		δ Crucis	144, 150 at = altitude with the moon.
		γ Crucis	88, 93, 91, 90.
8	32	γ Centauri	112, 112. Very satisfactory, the real and artificial star being exactly alike and not distinguishable from each other.
		ε Centauri	113, 113, 116, 118, 114.
		ζ Centauri	129, 129.
8	48	β Crucis	75, 75.

I. April 27, 1836.

e = 134° 14′; Δ = 944″; Log R = 0.0033
Log M = 2.9320.

A calm and superb night.

h.	m.		
8	46	α Centauri	45, 43.5, 45.5.
		β Centauri	71, 68, 69, 72, 70.
		α Crucis	71, 73, 68, 70.
		β Crucis	83, 82.5, 81, 79. All circumstances favourable. * at = altitude with ☽.
		γ Crucis	104, 103, 106, 110, 108.
		δ Crucis	161, 165, 164. A perfect resemblance amounting to undistinguishable identity of colour, light, &c. *The moon's image is too yellow for α or β Crucis or β Centauri.*
		γ Crucis	90.5, 92, 96, 93. Good. γ is too *red* for the moon.
		η Argûs	79, 81, 82, 82. Good. Examined the prism and found it much dewed. In consequence all the measures of this star as well as those preceding it, both of γ and δ Crucis, must be rejected. Carefully dried and warmed the prism, and resumed.
9	48	η Argûs	88, 88, 89.
		β Crucis	87, 93, 91.
		γ Crucis	98, 104, 98, 100.
		β Argûs	113, 114. No dew.
		ι Argûs	133.
		ε Argûs	115, 113.
		δ Argûs	120, 120.
		λ Argûs	124.
		κ Argûs	152.
		δ Crucis	180, 184. Prism carefully examined. No dew.
		α Circini	194.
10	36	γ Trianguli	169.
		Antares	70, 66, 69.
		δ Scorpii	136, 145, 143, 140. No dew. The preceding of the two eyes of Scorpio (δ and β). This is, if any difference, the brighter of the two.
		λ Scorpii	101, 102.
		θ Scorpii	108, 110, 114. No dew; same altitude as ☽.
		ε Scorpii	136, 138. Good.

J. June 29, 1836.

e = 193° 0′; Δ = 999″; Log R = 0.0072
Log M = 3.0389.

h.	m.		
9	48	α Centauri	66, 68, 69, 69. At exactly equal altitude with the moon. All circumstances favourable. Moon one day past the full. Superb sky. Calm.
		β Centauri	97, 99, 98.
		α Crucis	110, 108, 107, 111. Low.
10	14	θ Centauri	172, 174; very satisfactory. ☽ about 10° higher, but θ also high.
		α Lupi........	204, 198, 205.

No dew on glasses. Good observations. The comparisons are quite satisfactory as to the undistinguishable lustre of the real and false stars.

K. July 22, 1836.

e = 105° 12′; Δ = 963″; Log R = 0.0068
Log M = 2.8136.

The moon hardly more than dichotomized.

h.	m.		
6	42	α Centauri	32, 35, 31, 34, 35, 32.
		β Centauri	53, 56, 57, 56, 53.
		γ Centauri	103, 111, 108.
		β Corvi	132, 130::
		Arcturus	37.3. Mean of four measures, to be rejected, the glass being found dewed. Carefully dried.
		Arcturus	38, 41, 37, 49. Went in. Resumed, carefully first drying the prism.
9	0	α Pavonis	94, 94, 94. Equal alt.
		α Triang.......	82, 78, 84, 79. Nearer to the moon than α Pav.
		α Aquilæ......	62, 61. Equal alt.
		Lyræ	51, 53, 51. Rejected 59.

Sky superb, but the moon ill situated.

L. July 24, 1836.

e = 133° 12′; Δ = 987; Log R = 0.0067
Log M = 2.9604.

h.	m.		
10	19	β Centauri	76, 76, 81, 81.
		α Centauri	50, 45, 48, 53, 48; alt. 40°.
		α Pavonis	143, 137, 141. These two stars nearly equidistant from ☽
10	59	α Gruis	125, 128.
		Fomalhaut	97, 94, 98, 100.
11	29	α Aquilæ......	79, 79.
11	36	δ Capricorni ..	169, 170, 168.
11	44	γ Aquilæ......	164, 167.
11	49	α Aquilæ......	78. Moon and star at nearly equal altitudes.

M. July 26, 1836.

e = 160° 39′; Δ = 995″; Log R = 0.0066
Log M = 3.0298.

Moon nearly full. Not a trace of cloud in the sky. A dead calm.

h.	m.		
9	41	α Gruis	158, 160, 160. Rejected 169 being probably misread.
		β Gruis	186, 189, 187.
10	1	β Centauri	105, 101, 104.
		α Centauri	62, 63. Rejected 59. Prism examined. No dew found on it.
10	12	α Triang.......	151, 152, 150. Rejected 147 on re-examination. Very satisfactory, only N.B., α Trianguli is considerably higher and nearer to the moon than α Centauri.
10	21	α Lupi........	199, 200.
		α Centauri	63, 66, 64. Tried α Centauri with 59. Much too bright but, N.B., α is now somewhat lower. Yet the sky is *so* pure that this cannot be the reason. Reject 59. No dew. ☽ near zenith, α Lupi and α Centauri at equal altitudes, 40°±.
10	35	Antares	100, 100, 101. Excellent. Antares is yellower than ☽.
		α Pavonis	161, 166, 160.

h. m.		
10 53	α Gruis	148, 152, 146, 143, 147.
	β Gruis	168, 170, 170. Rejected 160 on re-examination. No dew on either prism or lens. N.B. This is an extraordinary discrepancy. 180 is *bearable* with β Gruis, though it is too feeble, 190 cannot be borne.
11 11	α Gruis	148, 151, 152.
	α Aquilæ......	107, 102, 106. Equidistant from the moon, but α Gruis is the highest in altitude.
11 26	α Aquilæ......	109, 106, 107.
	Fomalhaut	119, 118, 118. Nearly at equal altitudes. Fomalhaut is rather farther from the moon which is near the zenith.
12 26	β Ceti	187, 187, 187.
	α Eridani......	95, 91, 94, 95, 95. Twinkling. Maximum taken.
	α Phœnicis	196, 204, 199.

N. August 22, 1836.

$e = 130° 0'$; $\Delta = 982''$; Log R = 0.0046
Log M = 2.9493.

h. m.		
11 17	α Eridani	76, 74, 75, 75.
	β Ceti	117, 122, 120, 123, 118, 121.
11 47	α Phœnicis	146, 142, 145.

O. August 23, 1836.

$e = 143° 1'$; $\Delta = 984''$; Log R = 0.0046
Log M = 2.9906.

h. m.		
9 56	Fomalhaut	110, 109, 117. Rejected 102 on re-examination.
	α Aquilæ......	90, 93, 93, 94.
10 21	Fomalhaut	112, 106, 105.
	α Aquilæ......	96, 94, 90, 97.
	α Pavonis	143, 134, 140.
	α Gruis	122, 124, 124.
10 43	θ Scorpii	136, 130, 130, 133.

P. November 19, 1836.

$e = 142° 9'$; $\Delta = 922''$; Log R = 9.9946
Log M = 2.9519.

h. m.		
10 14	Fomalhaut	95, 92, 92, 94, 95.
	β Gruis	127, 127, 129.

h. m.		
	α Gruis	122, 120. Rather low.
10 34	α Eridani	68, 67, 68. Rejected 70 on re-examination. α Eridani and the ☽ have equal altitudes within 5°, α being the higher and the whiter.
	Canopus	35, 33, 35, 32. Canopus is too far from the ☽ (90°). Comparison difficult. Its colour is a tolerable match with that of the lunar image. Altitudes nearly equal.
11 4	ϵ Canis	109, 109, 110, 112. Rejected 100, 101, on re-examination.
	δ Canis	128, 124, 127.
	η Canis	148, 148. Good.
	o 2 Canis......	202. Good measure.
	β Canis	134, 133, 134.
11 34	Sirius	24, 22.
	Rigel	60, 60. Good.

Q. November 25, 1836.

$e = 211° 23'$; $\Delta = 886''$; Log R = 9.9941.

h. m.		
13 36	α Orionis	57, 56, 56.
	γ Orionis......	87.

The position being too inconvenient, left off.

R. December 17, 1836.

$e = 122° 59'$; $\Delta = 914''$; R = 9.9929; Log M = 2.8836.

h. m.		
10 58	α Orionis	52, 49, 45, 51.
	ζ Orionis......	95, 96.
	ϵ Orionis	88, 87.
	Sirius	18±; imperfect measure.

Position excessively awkward, and eye out of practice; ϵ greater than ζ, these two stars taken alternately.

S. December 26, 1836.

$e = 223° 35'$; $\Delta = 886''$; Log R = 9.9927
Log M = 2.9048.

h. m.		
13 44	α Crucis	74, 74, 75, 75, 73. Rejected 79 on re-examination.
	η Argûs	88, 86, 91, 88.5.
	β Crucis	86, 93, 87.

(277) In order to prepare these observations for reduction, it is first necessary to collect together the measures of each star taken on the same night, rejecting such as are in any decisive way indicated on the face of the record as unworthy of reliance, and taking a mean of the rest. It is not necessary to go into further minutiæ in the actual state of the subject. And it will be seen that by so dealing with the observations *en masse*, the results obtained have, upon the whole, such a degree of consistency as to relieve us from any misgivings on the score of exactness in this mode of procedure. The following, then, are the data so prepared and arranged for each night, according to the order of precedence of the stars observed, as collected from the obser-

vations themselves. In each night's results, the first column contains the name of the star; the second, the whole number of individual equalizations made of it with the lunar image; the third, the mean of this number of individual distances as read off (*rejectis regiciendis*); and the last, the double logarithms of those means.

Star.	No.	d.	2 logd.
(A)			
Sirius........	1	16.7	2.4454
Arcturus	1	29.8	2.9484
Rigel	2	41.5	3.2371
α Orionis	1	49.8	3.3945
ε Canis	1	74.9	3.7490
γ Argûs......	1	82.1	3.8287
δ Canis	1	89.7	3.9056
δ Argûs......	1	90.4	3.9123
ε Orionis	1	92.3	3.9304
λ Argûs......	1	95.0	3.9554
β Canis	1	97.1	3.9744
κ Orionis	3	99.0	3.9910
ζ Orionis	1	99.9	3.9991
δ Orionis	1	106.2	4.0522
α Leporis	1	108.6	4.0717
ζ Argûs......	1	108.7	4.0743
η Canis	1	119.7	4.1562
π Argûs	1	125.5	4.1973
ι Orionis	1	127.1	4.2083
(B)			
Jupiter	1	19.3	2.5711
Sirius........	2	27.4	2.8755
α Centauri....	2	46.9	3.3386
Saturn	2	55.8	3.4940
β Centauri....	1	59.5	3.5490
Procyon......	2	61.1	3.5721
Spica	1	81.5	3.8223
η Argûs......	1	89.1	3.8998
α Trianguli ..	2	98.8	3.9895
ε Canis	1	100.5	4.0043
β Argûs......	1	112.5	4.1023
δ Canis	1	115.4	4.1244
ε Argûs	1	116.3	4.1312
λ Argûs......	1	122.5	4.1763
δ Argûs......	1	132.2	4.2425
ι Argûs	1	146.3	4.3305
μ Argûs......	1	155.5	4.3835
κ Argûs......	1	177.5	4.4984
γ Trianguli ..	1	179.3	4.5072
β Trianguli ..	1	181.1	4.5158
υ Argus......	1	214.0	4.6608
(C)			
α Centauri....	4	63.0	3.5987
β Centauri....	6	100.6	4.0055
α Crucis	3	110.8	4.0891
β Crucis	7	124.4	4.1896
(D)			
α Centauri....	8	82.1	3.8292
β Centauri....	6	123.0	4.1800
α Crucis	5	129.9	4.2274
β Crucis	6	151.3	4.3599
γ Crucis	5	162.8	4.4233
(E)			
α Centauri....	12	60.5	3.5631

Star.	No.	d.	2 logd.
β Centauri....	16	8.88	3.8972
α Crucis	29	94.4	3.9496
η Argus......	5	110.2	4.0844
β Crucis	9	119.0	4.1511
γ Crucis	3	129.3	4.2234
λ Scorpii	7	131.1	4.2354
α Trianguli ..	14	132.8	4.2463
θ Scorpii	5	152.4	4.3654
ε Sagittarii....	5	153.6	4.3728
σ Sagittarii ..	7	171.6	4.4689
γ Centauri....	4	179.2	4.5069
ε Centauri	4	179.7	4.5093
α Muscæ	3	199.3	4.5992
(F)			
α Centauri....	9	43.6	3.2782
Arcturus	4	55.0	3.4807
α Crucis	6	71.8	3.7126
β Centauri....	7	79.6	3.8015
η Argûs......	5	93.2	3.9388
β Crucis	5	95.2	3.9573
γ Crucis	6	108.8	4.0734
ε Sagittarii....	4	127.0	4.2076
α Trianguli ..	3	129.7	4.2257
σ Sagittarii ..	5	138.6	4.2835
γ Corvi	5	174.8	4.4851
γ Virginis	5	180.0	4.5106
δ Corvi	2	194.0	4.5756
(G)			
α Centauri....	1	27.0	2.8627
Arcturus	3	34.3	3.0713
Saturn	3	42.7	3.2602
α Crucis	2	43.5	3.2770
β Centauri....	3	44.0	3.2869
Spica	5	46.6	3.3368
(H)			
Sirius........	3	17.8	2.5023
Procyon......	7	54.4	3.4717
Spica	4	71.7	3.7116
β Crucis	2	75.0	3.7501
ε Canis	4	86.7	3.8765
γ Crucis	4	90.5	3.9133
δ Canis	2	94.0	3.9463
β Canis	4	96.7	3.9713
γ Centauri....	2	112.0	4.0984
ε Centauri....	5	114.8	4.1199
ζ Centauri....	2	129.0	4.2219
β Corvi	3	136.3	4.2692
δ Crucis	2	147.0	4.3346
(I)			
α Centauri....	3	44.7	3.3000
Antares	3	68.3	3.6692
β Centauri....	5	70.0	3.6902
α Crucis	4	70.5	3.6964
β Crucis	7	85.2	3.8610
η Argûs......	3	88.3	3.8922

Star.	No.	d.	2 logd.
λ Scorpii	2	101.5	4.0129
γ Crucis	9	103.4	4.0294
θ Scorpii	3	108.0	4.0668
β Argus......	2	113.5	4.1100
ε Argûs	2	114.0	4.1138
δ Argûs......	2	120.0	4.1584
λ Argûs......	1	124.0	4.1868
ι Argûs	1	133.0	4.2477
ε Scorpii	2	137.0	4.2734
δ Scorpii	4	141.0	4.2984
κ Argûs	1	152.0	4.3637
γ Trianguli ..	1	169.0	4.4558
δ Crucis......	2	182.0	4.5201
α Circini	1	194.0	4.5756
(J)			
α Centauri....	4	68.0	3.6650
β Centauri....	3	98.0	3.9825
α Crucis	4	109.0	4.0749
θ Centauri....	2	173.0	4.4761
α Lupi	3	202.3	4.6121
(K)			
α Centauri....	6	33.2	3.0412
Arcturus	4	38.7	3.1765
α Lyræ	3	51.7	3.4265
β Centauri....	5	55.0	3.4807
α Aquilæ	2	61.5	3.5778
α Trianguli ..	4	80.7	3.8143
α Pavonis	3	94.0	3.9463
γ Centauri....	3	107.3	4.0614
β Corvi	2	131.0	4.2345
(L)			
α Centauri....	5	48.8	3.3768
β Centauri....	4	78.5	3.7897
α Aquilæ	3	78.7	3.7916
Fomalhaut....	4	97.5	3.9780
α Gruis	2	126.5	4.2042
α Pavonis	3	140.3	4.2943
γ Aquilæ	2	165.5	4.4376
δ Capricorni ..	3	169.0	4.4558
(M)			
α Centauri....	5	63.4	3.6042
α Eridani	5	94.0	3.9463
Antares	3	100.3	4.0029
β Centauri....	3	100.3	4.0285
α Aquilæ	6	106.2	4.0520
Fomalhaut....	3	118.3	4.1462
α Gruis	8	148.4	4.3427
α Trianguli ..	3	151.0	4.3580
α Pavonis	3	162.3	4.4208
β Gruis	3	169.3	4.4575
β Ceti	3	187.0	4.5437
α Lupi	2	199.5	4.5995
α Phœnicis ..	3	199.7	4.6004

Star.	No.	d.	2 logd.	Star.	No.	d.	2 logd.	Star.	No.	d.	2 logd.
				(P)				(Q)			
(N)				Sirius........	2	21.0	2.6444	α Orionis	3	56.3	3.5015
α Eridani	4	75.0	3.7501	Canopus	4	33.7	3.0565	γ Orionis	1	87.0	3.8790
β Ceti	6	120.2	4.1596	Rigel........	2	60.0	3.5563				
α Phœnicis ..	3	144.3	4.3187	α Eridani	3	67.7	3.6608	(R)			
				Fomalhaut....	5	93.6	3.9426	Sirius........	1	18.0	2.5105
				ε Canis	4	110.0	4.0828	α Orionis	4	49.2	3.3848
(O)				α Gruis	2	121.0	4.1656	ε Orionis	2	87.5	3.8840
α Aquilæ	8	93.4	3.9404	δ Canis	3	126.3	4.2030	ζ Orionis	2	95.5	3.9600
Fomalhaut....	6	108.2	4.0682	β Gruis	3	127.7	4.2121				
α Gruis	3	123.3	4.1822	β Canis	3	133.7	4.2518	(S)			
θ Scorpii	4	132.2	4.2428	η Canis	2	148.0	4.3405	α Crucis	4	74.0	3.7385
α Pavonis	3	139.0	4.2860	o 2 Canis	1	202.0	4.6107	η Argûs......	4	88.4	3.8926
								β Crucis	3	88.7	3.8956

(278) The influence exercised upon these comparisons by the illumination of the general surface of the sky on which the stars are seen projected will at once be apparent, if, using the formula $\frac{M}{d^2}$, we compute from it the results in the case of any one star, observed on several nights. Taking α Centauri, for instance, which occurs on the series marked B, C, D, E, F, G, I, J, K, L, M, we find the several results come out as follows, viz.:—B, 0.443; C, 0.259; D, 0.156; E, 0.289; F, 0.505; G, 0.838; I, 0.429; J, 0.236; K, 0.592; L, 0.384; M, 0.266. Such enormous differences show clearly, that, as a formula of reduction, the above is utterly inapplicable. Indeed, at first sight, it would almost appear from this that absolutely no conclusion can be drawn from the observations or the method in question. This, however, is very far from being a correct view of the subject, since, if, instead of comparing the results in this manner for a single star, we take any two stars which occur together in more than one series, and compare, not the absolute numbers resulting from the formula in question, but the ratios of those numbers, we shall find, not, indeed, a precise, but, with a few exceptions (such as might be expected in the first trials of a new method), a reasonably good accordance. Thus, if we take α and β Centauri for our stars of comparison, and fixing upon α for a standard, denote its light by 1.000, we shall find by this method, for β the numbers following, viz.:—

In series C 0.3919	In series G 0.3766	In series K 0.3635
D 0.4459	I 0.4072	L 0.3865
E 0.4633	J 0.4815	M 0.3764

It is true that the results in series B and F (the only others in which both these stars were observed), diverge greatly from the above, being respectively 0.6160 and 0.2997. But in the former of these only a single equalization was made of β, and two of α, and *that* while yet unaware from experience of the precautions necessary for ensuring correctness, and before any habit of observing had become established. As regards the series F, it is expressly stated to have been made under such unfavourable circumstances as to destroy all confidence in its results. Allowing both these series, however, their due weights (*represented by the sum of the numbers of equalizations of the two stars in each*), and following the same rule with the others, we arrive at a mean value $\beta = 0.4137$ for the light of β Centauri as compared with $\alpha = 1.000$, which, as a first approximation certainly seems entitled on the mere showing of the numbers, to some considerable degree of confidence.

(279) Let us now take a third star, α Crucis, which occurs both with α and with β Centauri in the series C D E F G I J, and with neither of them in any other. And first, comparing it in the mode above indicated with the former, we find for the individual resulting values (still on the scale on which α Centauri is 1.000) as follows:—

α Crucis by C	= 0.3233	α Crucis by F	= 0.3678	α Crucis by I	= 0.4015
D	0.3998	G	0.3852	J	0.3892
E	0.4107				

which treated by the same rule* as to the weight of the several results, gives 0.3936. The same process carried out between α Crucis and β Centauri, gives for the quotient of the numbers representing these two stars, 0.9452, which, multiplied by 0.4137, the number before found for Centauri, gives α Crucis = 0.3910, and taking a mean between this and the result obtained by direct comparison with α, we arrive at the approximate value 0.3923 for the star in question.

(280) Proceeding in this way successively with the other stars in the order of their importance and frequency of occurrence, and using in each case such combinations as involve the greatest mass of equalizations, and afford the largest grasp of the totality of the observations, we obtain the following series of *Provisional* or temporary values for the intrinsic light of each star occurring in all the series.

Sirius	4.154	γ Orionis	——	λ Argûs	0.1321	γ Aquilæ	0.0899
Canopus	1.991	γ Crucis	0.2066	β Ceti	.1300	δ Capricorni	.0860
α Centauri	1.000	ϵ Canis	.1998	ζ Orionis	.1278	α Muscæ	.0858
		λ Scorpii	.1971	κ Orionis	.1197	κ Argûs	.0842
Arcturus	0.7734	α Gruis	.1829	ϵ Centauri	.1176	μ Argûs	.0815
Rigel	.6502	α Trianguli	.1798	σ Sagittarii	.1173	γ Corvi	.0760
Procyon	.5106	γ Argûs	.1740	ι Argûs	.1116	β Corvi	.0754
α Orionis	.5106	θ Scorpii	.1600	ϵ Scorpii	.1084	π Argûs	.0747
α Eridani	.4575	β Argus	.1577	γ Centauri	.1080	ι Orionis	.0727
α Lyræ	.4506	ϵ Argûs	.1550	α Phœnicis	.1060	γ Virginis	.0716
Antares	.4216	δ Canis	.1546	α Lupi	.1048	γ Trianguli	.0698
β Antares	.4137	ϵ Orionis	.1504	δ Orionis	.1040	δ Crucis	.0643
α Crucis	.3923	θ Centauri	.1485	δ Scorpii	.1021	δ Corvi	.0610
α Aquilæ	.3587	β Canis	.1446	α Leporis	.0997	β Trianguli	.0600
Spica	.3147	α Pavonis	.1444	ζ Argûs	.0993	o 2 Canis	.0560
Fomalhaut	.2768	ϵ Sagittarii	.1437	η Canis	.0982	α Circini	.0544
η Argûs	.2723	β Gruis	.1412	ζ Centauri	.0906	υ Argûs	.0430
β Crucis	.2619	δ Argûs	.1382				

(281) These numbers, as already observed, are provisional, like those in Art. 247 (B) provisionally concluded from the sequences. They are derived only from a partial reduction of the observations, and are destined merely to afford a handle for a complete and impartial reduction of the whole, to perform which we proceed as follows. Taking $\frac{\mu}{d^2}$ for the expression of the light of the compared star, μ will be a co-efficient which, though variable from night to night, and, indeed, strictly speaking, from instant to instant, may yet be regarded as constant throughout any

* To avoid prolixity of arithmetical calculation in these reductions, a weight = 1 is allowed to every five equalizations, and if the sum of the numbers be not divisible by five, the nearest integer result has been used. This will explain any trifling differences which will appear to the reader on repeating the calculations.

single series. Now, the immediate object of inquiry is to assign for each series such a value of μ as shall give consistent results when the individual values of $\frac{\mu}{d^2}$ for any one star deduced from different series are compared together: and the degree of such consistency will be the test of our success in so doing. Now, if the observations were perfect, and the provisional values assigned to the stars in the last article exact, then calling these values S, S', &c., and denoting by d, d', &c., the distances of equalization of any number of the stars observed in any series, we ought to have for that series

$$S = \frac{\mu}{d^2}; \quad S' = \frac{\mu}{d'^2}; \quad \&c.$$

and therefore

$$\mu = Sd^2 = S'd'^2 = S''d''^2 = \&c.$$

But this being only approximately true, and our object being to obtain mean results, we determine a mean value of μ for the series in question, by taking a mean of all these values. Having thus obtained μ, we then recompute the values of s, s', s'', &c. by the formula $s' = \frac{\mu}{d^2}$ The values so obtained will obviously be much more independent of individual errors of observation than those from which we set out. And a repetition of this process, should it appear necessary, would free us altogether from specialties, and bring each result to rest on the whole mass of observation for its co-efficient of reduction, and on its own individual accuracy for the value of its result.

(282) Confining ourselves, however, to one process of the kind indicated, which may be considered sufficient in the reduction of observations confessedly imperfect, and in the nature of a first trial, to be followed up or not according to the estimate which may be formed of its applicability to our object: the following are the individual values of $\frac{\mu}{d^2}$ so obtained for each star, and for every series in which it occurs, *without distinction of good or bad observations, favourable or unfavourable circumstances.* In taking the means only two results have been rejected, viz.: the value 1.366 assigned to Arcturus in Series A, and 0.612 that of β Centauri in Series B: each, it should be observed, resting on a single equalization in the very beginning of my experience of this sort of observation, and in the case of Arcturus, evidently vitiated by the want of sufficient altitude of the moon at the moment of comparison. Sirius, it must be remarked, is too bright an object to admit of being at all fairly observed in comparison with the other stars, with a lens of the same focus. The greatest difficulty and uncertainty was always experienced with this star, in pronouncing upon the point of equalization, and though I have no doubt that the mean of its five determinations is a tolerable approach to the truth, I have less confidence in it than in almost any of the others, except α Lyræ, which, from its low and unfavourable situation, has been necessarily under-estimated.

Sirius.	
A	4.348
B	2.886
H	4.610
P	5.320
R	3.781
	4.187

Canopus.	
P	2.060

α Centauri.	
B	0.994
C	1.027
D	0.930
E	0.930
F	1.235
G	1.061
I	1.010
J	0.952
K	1.120
L	1.095
M	1.014
	1.033

Arcturus.	
A	1.366
F	0.775
G	0.656
K	0.820
	0.750
Rejecting A.	

Rigel.	
A	0.702
P	0.652
	0.676

Procyon.	
B	0.580
H	0.495
	0.537

α Orionis.	
A	0.489
Q	0.511
R	0.505
	0.502

α Lyræ.	
K	0.461
(Too low.)	

α Eridani.	
M	0.461
N	0.395
P	0.512
	0.456

Antares.	
I	0.432
M	0.405
	0.418

β Centauri.	
B	0.612
C	0.402
D	0.415
E	0.440
F	0.370
G	0.400
I	0.411
J	0.458
K	0.407
L	0.423
M	0.382
	0.411

α Crucis.	
C	0.332
D	0.372
E	0.390
F	0.454
G	0.409
I	0.405
J	0.370
S	0.385
	0.390

α Aquilæ.	
K	0.326
L	0.421
M	0.362
O	0.338
	0.362

Spica.	
B	0.319
G	0.356
H	0.285
	0.320

η Argûs.	
B	0.273
E	0.286
F	0.270
I	0.258
S	0.270
	0.271

Fomalhaut.	
L	0.274
M	0.291
O	0.252
P	0.268
	0.271

β Crucis.	
C	0.263
D	0.274
E	0.245
F	0.259
H	0.261
I	0.277
S	0.268
	0.264

γ Orionis.	
Q	214

ε Canis.	
A	0.216
B	0.215
H	0.195
P	0.194
	0.205

γ Crucis.	
D	0.237
E	0.208
F	0.198
H	0.179
I	0.188
	0.202

λ Scorpii.	
E	0.202
I	0.196
	0.199

α Trianguli.	
B	0.222
E	0.197
F	0.139
K	0.189
M	0.179
	0.185

γ Argûs.	
A	0.180

α Gruis.	
L	0.163
M	0.185
O	0.194
P	0.160
	0.175

θ Scorpii.	
E	0.150
I	0.173
O	0.169
	0.164

β Argûs.	
B	0.171
I	0.156
	0.163

ε Argûs.	
B	0.160
I	0.155
	0.157

δ Canis.	
A	0.151
B	0.163
H	0.166
P	0.147
	0.157

ε Orionis.	
A	0.142
R	0.160
	0.151

θ Centauri.	
J	0.147

ε Sagittarii.	
E	0.147
F	0.145
	0.146

α Pavonis.	
K	0.139
L	0.132
M	0.155
O	0.153
	0.145

β Gruis.	
M	0.142
P	0.144
	0.143

β Canis.	
A	0.129
H	0.157
P	0.131
	0.139

δ Argûs.	
A	0.148
B	0.124
I	0.140
	0.137

λ Argûs.	
A	0.134
B	0.144
I	0.131
	0.136

ζ Orionis.	
A	0.121
R	0.134
	0.127

β Ceti.	
M	0.117
N	0.134
	0.126

κ Orionis.	
A	0.124

σ Sagittarii.	
E	0.118
F	0.122
	0.120

γ Centauri.	
E	0.108
H	0.117
K	0.107
	0.111

ε Centauri.	
E	0.108
H	0.111
	0.109

δ Orionis.	
A	0.108

ε Scorpii.	
I	0.107

ι Argûs.	
B	0.101
I	0.114
	0.107

α Lupi.	
J	0.107
M	0.103
	0.105

α Phœnicis.	
M	0.102
N	0.107
	0.104

ζ Argûs.	
A	0.104

α Leporis.	
A	0.103

δ Scorpii.	
I	0.101

η Canis.	
A	0.085
P	0.107
	0.096

γ Aquilæ.	
L	0.095

δ Capricorni.	
L	0.091

μ Argûs.	
B	0.090

ζ Centauri.	
H	0.088

α Muscæ.	
E	0.087

κ Argûs.	
B	0.069
I	0.087
	0.078

γ Corvi.	
F	0.077

π Argûs.	
A	0.077

β Corvi.	
H	0.079
K	0.072
	0.075

ι Orionis.	γ Trianguli.	β Trianguli.		o 2 Canis.	υ Argus.
A 0.075	B 0.067	B 0.066	I 0.061	P 0.058	B 0.047 ? ?
	I 0.071				
	0.069		0.064		
γ Virginis.		δ Crucis.	δ Corvi.	α Circini.	
F 0.072		H 0.068	F 0.062	I 0.054	

(283) It only remains to reduce all these results in the uniform ratio of 1000 : 1033 so as to bring them to a scale in which α Centauri shall (as originally proposed) be represented by 1.000. This done, and the final values arranged in order of magnitude, we get the following Table :—

Photometric Determination of the Comparative Intensities of the Light of Sixty-nine Stars, as deduced from the Foregoing Observations.

Sirius	4.052	ε Canis	0.198	ζ Orionis	0.123	ζ Centauri	0.085
Canopus	1.994	γ Crucis	0.195	β Ceti	0.122	α Muscæ	0.084
α Centauri	1.000	λ Scorpii	0.192	κ Orionis	0.120	κ Argûs	0.075
Arcturus	0.726	α Trianguli	0.179	σ Sagittarii	0.116	γ Corvi	0.074
Rigel	0.654	γ Argûs	0.174	γ Centauri	0.107	π Argûs	0.074
Procyon	0.520	α Gruis	0.169	ε Centauri	0.105	β Corvi	0.073
α Orionis	0.484	θ Scorpii	0.159	δ Orionis	0.104	ι Orionis	0.073
Lyra	0.446	β Argûs	0.158	ε Scorpii	0.103	γ Virginis	0.070
α Eridani	0.441	ε Argûs	0.152	ι Argûs	0.103	γ Trianguli	0.067
Antares	0.404	δ Canis	0.152	α Lupi	0.102	β Trianguli	0.064
β Centauri	0.399	ε Orionis	0.146	α Phœnicis	0.101	δ Crucis	0.062
α Crucis	0.377	θ Centauri	0.142	ζ Argûs	0.101	δ Corvi	0.060
α Aquilæ	0.350	ε Sagittarii	0.141	α Leporis	0.100	o 2 Canis	0.056
Spica	0.309	α Pavonis	0.140	δ Scorpii	0.098	α Circini	0.052
η Argûs	0.262	β Gruis	0.138	η Canis	0.093	υ Argûs	0.045
Fomalhaut	0.262	β Canis	0.134	γ Aquilæ	0.092		
β Crucis	0.255	δ Argûs	0.132	δ Capricorni	0.088		
γ Orionis	0.207	λ Argûs	0.131	μ Argûs	0.087		

(284) The values of μ which have been computed in conformity with these principles, and which have served for the calculation of the foregoing tables, are of no importance except as matters of curiosity. Nevertheless, as their consideration leads to a result of some interest in reference to the amount of influence which the light of the moon (or any other extrinsic light, as that of twilight, aurora, &c.) exercises in enfeebling the impression of the stars on the eye, I subjoin them in a short table, arranged according to the calculated values of M (the absolute quantity of moonlight on each occasion), on which they necessarily depend as their principal *argument*. The logarithms are stated rather than the numerical values, for a reason which will presently appear, and all the values of log. μ are diminished by 0.0845 (the logarithm of 1.033) to bring them to correspondence with the final results in the table of Art. (283).

	Log. M.	Log. μ.		Log. M.	Log. μ.		Log. M.	Log. μ.		Log. M.	Log. μ.
G	2.7861	2.8040	S	2.9048	3.2398	L	2.9604	3.3318	D	3.0232	3.7133
K	2.8136	3.0060	I	2.9320	3.2197	F	2.9815	3.2856	E	3.0234	3.4565
H	2.8676	3.0815	Q	2.9334	3.1251	B	2.9848	3.2513	M	3.0298	3.5258
R	2.8836	3.0036	N	2.9493	3.2936	O	2.9906	3.3852	J	3.0389	3.5589
A	2.8962	2.9992	P	2.9519	3.2858	C	3.0116	3.5168			

(285) It is evident, on a mere inspection of this table, that μ increases in a much higher ratio than M. If we suppose it to vary as some indeterminate power of M, or which comes to the same thing, if we suppose the relation between μ and M to be expressed by an equation of the form $\mu = k.\, M^p$, we have to determine the values of the constant co-efficients k and p, so as to agree on the whole best with the totality of these conditions. For this purpose the shortest and most effectual mode of proceeding is to project the corresponding values of log. M and log. μ as abscissæ and ordinates on an interpolating chart, and pass a straight line in the most advantageous manner among the projected points. This having been accordingly done, and the extreme co-ordinates of the line read off, its equation was found to be

$$\text{Log}\, \mu = 2.98 + \text{Log}\, M - 5.5015$$

which gives for the values of k and p

$$k = 0.0000031514; \qquad p = 2.98$$

whence the following value of μ, as nearly as it can be expressed by any formula of this nature,

$$\mu = 3.1514 \times \left(\frac{M}{1000}\right)^{2.98}; \qquad \text{(A)}$$

The value of p is so nearly 3, that the result arrived at may be simply announced by saying that the value of the co-efficient μ is as the cube of the quantity of moonlight.

(286) To perceive the full import of this law, we must consider that a star which, when the moonlight is of the intensity M, requires to be placed at the distance d to be judged of equal brightness with the moon's image, necessarily produces an effect on the eye which is measured by $\frac{M}{d^2}$, because the moon's image is seen *not as the star is* on the variably bright ground of the sky, but on a definitely dark ground, viz., the hinder side of the screen which carries the lens, and similarly, the same star which with an intensity of moonlight $= M'$ equalizes with the moon's image at the distance d' has its actual effect on the retina truly measured by $\frac{M'}{d'^2}$ under its new circumstances of circumambient illumination. The ratio of these effects, therefore, which we shall call s and s', will be that of $\frac{M}{d^2} : \frac{M'}{d'^2}$, so that we have $\frac{s'}{s} = \frac{M'}{M} \cdot \frac{d^2}{d'^2}$. But by the very definition of the co-efficient μ we have $\frac{\mu}{d^2} = \frac{\mu'}{d'^2}$; whence it follows that $\frac{d}{d'^2} = \frac{\mu}{\mu'}$; which being substituted in the former equation, gives

$$\frac{s'}{s} = \frac{M'}{M} \cdot \frac{\mu}{\mu'} = \left(\frac{M}{M'}\right)^2; \qquad \text{(B)}$$

by simply writing for μ and μ' their values $k\, M^3$, and $k\, M'^3$, from which it appears that, within the limits of our experiments, *the effective impression of a star on the retina is inversely as the square of the illumination of the ground of the sky on which it is seen projected.* I say within the limits of the experiments, or within an illumination not much exceeding that of full moonlight, nor much inferior to that of the moon in her first quarter; for it is evident that for much greater or much feebler illuminations an empirical law of this kind will require modification, since Venus is visible to the naked eye with the sun above the horizon;* and since, moreover,

* General Bell, Secretary to Government for the Cape Colony, during the period of my residence in South Africa, permits me to state that in the year 1835, during the months of February and March, he observed Venus

in the total absence of moonlight, when no other illumination prevails than that produced by the stars themselves and some slight remnants of twilight, the impression of each star is not so violently exaggerated as this formula would then make it, but would agree better with some expression of the form $\frac{s'}{s} = \left(\frac{M+m}{M'+m}\right)^2$ where m is some small constant.

(287) There remains a very interesting subject of inquiry, which consists in comparing our photometric results with the conventional scale of naked-eye magnitudes adopted in our sequences. To this end it is requisite to project the two series of values (those representing the conventional magnitude on the one hand and the light on the other) as the abscissa and ordinate of an interpolating curve, in the mode already so often exemplified. This I have accordingly done, and calling x the conventional magnitude of any star (among those observed in both series) and y its light, that of α Centauri being 1.000, I find the following table to result from reading off the interpolating curve so constructed for every decimal of a magnitude between $x = 1$ and $x = 3.6$. The earlier magnitudes being purely arbitrary are omitted, and those beyond 3.6 cannot be included for want of astrometer observations, which, indeed, already became difficult and uncertain below the third magnitude.

Readings of the Interpolating Curve, exhibiting the Correspondence between the Conventional Magnitude x, and the Light y, of Stars as resulting from the Sequences, and from Photometric Measures.

x	y	x	y	x	y	x	y	x	y
1.0	.500	1.6	.242	2.2	.149	2.7	.104	3.2	.075
1.1	.442	1.7	.220	2.3	.138	2.8	.097	3.3	.072
1.2	.387	1.8	.202	2.4	.129	2.9	.092	3.4	.068
1.3	.340	1.9	.185	2.5	.120	3.0	.087	3.5	.065
1.4	.300	2.0	.171	2.6	.112	3.1	.080	3.6	.062
1.5	.269	2.1	.159						

(288) A very slight consideration of the form of this curve, and of the course of the numbers in the above table, suffices to show that it approaches very nearly indeed to a cubic hyperbola, the form of whose equation is $(x+a)^2 . y = b$, and it only remains to determine the numerical values of a and b, so as to represent in the best manner possible, the correspondence of x and y throughout the extent of the table. To this end, supposing x, x' to represent any two values of x given by the table, and y, y' the corresponding values of y, we have

$$(x+a)^2 . y = b; \quad (x'+a)^2 . y' = b$$

whence it is easy to obtain

$$a = -\frac{x'\sqrt{y'} - x\sqrt{y}}{\sqrt{y'} - \sqrt{y}}; \quad b = y\,y'.\left(\frac{x' - x}{\sqrt{y'} - \sqrt{y}}\right)^2.$$

with the naked eye, and without any instrumental aid in searching for her (beyond a recollection of her place in reference to certain buildings, chimneys, &c.), from one of two stations in Cape Town, or from his country residence on the Camp Ground, several hours after sunrise, on thirty-two out of thirty-six days, among which were twenty-two consecutive ones. After some days' observation in the country, having missed the observation on the Camp Ground owing to some light clouds, he found the planet at a later hour in town by *sweeping*, using an angle and cornice of a church for a guide to the eye, and shifting his position backwards and forwards till found.

Taking now the extreme values set down in the above table for x, x', y, y', we have

$$x = 1, \quad y = 0{\cdot}500; \quad x' = 3{\cdot}6, \quad y' = 0{\cdot}062$$

whence, executing the calculations indicated, we find*

$$b = 1, \quad a = \sqrt{2} - 1 = 0{\cdot}4142$$

and for the equation between x and y

$$(x + \sqrt{2} - 1)^2 . y = 1; \qquad \text{(C)}$$

(289) How nearly this equation represents the curve in question will appear from the following comparison of the values of y, as calculated from it, and as read off on the curve as already stated:—

x	y		x	y		x	y		x	y	
	By Curve.	By Equ.		By Curve.	By Equ.		By Curve.	By Equ.		By Curve.	By Equ.
1.0	.500	.500	1.7	.220	.224	2.4	.129	.126	3.1	.080	.081
1.1	.442	.436	1.8	.202	.204	2.5	.120	.118	3.2	.075	.077
1.2	.387	.384	1.9	.185	.187	2.6	.112	.110	3.3	.072	.072
1.3	.340	.340	2.0	.171	.172	2.7	.104	.103	3.4	.068	.069
1.4	.300	.304	2.1	.159	.156	2.8	.097	.097	3.5	.065	.065
1.5	.269	.273	2.2	.149	.146	2.9	.092	.091	3.6	.062	.062
1.6	.242	.247	2.3	.138	.136	3.0	.087	.086			

A better correspondence could hardly be desired, and certainly could not have been expected. It is so complete, that as a representation of the totality of the observations, the equation may be regarded as a perfect substitute for the curve, which latter may therefore be dismissed altogether from further consideration.

(290) This equation once obtained, may be applied either to the numerical estimation of the light of a star of given magnitude, or *vice versâ*, from an experimental determination of its light either by means of such an astrometer as above described, or any other, to assign its place in the scale of conventional magnitudes. Let us now therefore proceed to determine by its aid the magnitudes which ought to be assigned to the several stars of our list in the table Art. 280, and to compare them with those previously assigned to them from the sequence observations. This is done in the subjoined table, in which it is, however, to be borne in mind, that the sequence magnitudes of the larger stars, from Sirius down to Procyon or Orion, are purely arbitrary, and rest on no other evidence than a hardly more than conjectural *aperçu* of the course of the interpolating curve alluded to in Art. 244. The approach to agreement between the two series in their earlier members which does obtain, is therefore, *pro tanto*, a verification of this

* The exact arithmetical calculation gives $b = 1.0001$, $a = 0.4143$. The coincidence, which is a remarkable one, is purely accidental, and was not foreseen when the data in the text were fixed upon. It is true that the value of y (0.500), corresponding to $x = 1$ *was* designedly chosen—the natural course of the interpolating curve, allowing *some little latitude* of choice at this place, which was taken advantage of to give a round number, but all the rest of its course is strictly limited, this point once being fixed.

conjecture, and of the extension of our nomenclature of magnitudes to degrees of brightness higher than that to which the magnitude 1 is assigned in the adopted scale. In this part of the scale the astrometer values are alone entitled to any consideration.

Comparison of the Magnitudes of 68 Stars as deduced on the one hand from the method of Sequences, and on the other from Photometric Observation, by the aid of the Astrometer.

Star.	By Seq.	By Astr.	Star.	By Seq.	By Astr.	Star.	By Seq.	By Astr.
Sirius	0.10:	0.08	γ Argûs	2.08	1.98	ϵ Centauri	2.82	2.67
Canopus	0.22:	0.29	γ Orionis	2.10	1.78	η Canis	2.85	2.86
α Centauri	0.34:	0.59	ϵ Argûs	2.18	2.15	δ Scorpii	2.86	2.78
Arcturus	0.45:	0.77	α Trianguli	2.23	1.95	γ Corvi	2.90	3.26
Lyra	0.66:	1.08	ϵ Sagittarii	2.26	2.25	κ Argûs	2.94	3.24
Rigel	0.76	0.82	θ Scorpii	2.29	2.09	β Corvi	2.95	3.29
Procyon	0.85	0.97	δ Canis	2.32	2.15	ζ Centauri	2.96	3.02
α Eridani	0.93	1.09	α Pavonis	2.33	2.26	π Argûs	2.98	3.26
α Orionis	1.00	1.02	β Gruis	2.36	2.28	α Leporis	3.00	2.75
β Centauri	1.14	1.17	σ Sagittarii	2.41	2.52	γ Aquilæ	3.07	2.88
α Crucis	1.21	1.21	δ Argûs	2.42	2.34	γ Virginis	3.08	3.37
Antares	1.28	1.16	λ Argûs	2.46	2.35	μ Argûs	3.08	2.97
α Aquilæ	1.35	1.28	β Ceti	2.46	2.45	δ Capricorni	3.20	2.96
Spica	1.41	1.38	θ Centauri	2.54	2.24	δ Corvi	3.22	3.67
Fomalhaut	1.47	1.54	β Canis	2.58	2.32	ι Orionis	3.37	3.29
β Crucis	1.59	1.57	κ Orionis	2.59	2.37	α Muscæ	3.43	3.04
α Gruis	1.69	2.02	δ Orionis	2.61	2.69	β Trianguli	3.46	3.54
γ Crucis	1.73	1.85	γ Centauri	2.68	2.64	γ Trianguli	3.51	3.45
ϵ Orionis	1.84	2.20	ϵ Scorpii	2.71	2.70	υ Argûs	3.53	4.30
ϵ Canis	1.86	1.83	ζ Argûs	2.72	2.73	δ Crucis	3.57	3.60
λ Scorpii	1.87	1.87	α Phœnicis	2.78	2.73	o^2 Canis	3.75	3.81
ζ Orionis	2.01	2.44	ι Argûs	2.80	2.70	α Circini	3.78	3.97
β Argûs	2.03	2.10	α Lupi	2.82	2.72			

(291) In judging of the general amount of coincidence between the two series here presented, it is by no means desired to under-estimate or unduly palliate the rather considerable and numerous cases of discordance which occur. Out of sixty-three stars compared, inferior to Lyra in brightness (for of the cases above that limit no fair judgment can be formed), there are no less than eighteen in which the disagreement of the assigned values exceeds one-fifth of a magnitude, a quantity respecting which the judgment of a practised eye cannot be deceived. Nevertheless, it ought to be remembered that these extreme differences are, in all probability, the sums of errors in opposite directions, of the values afforded by the two methods. And it must further be remarked, that in a majority of these cases the photometric determination rests on a single night's observation, and not unfrequently on a single equalization. The worst case of all, that of υ Argus, is of this description, and ought undoubtedly to be rejected as altogether erroneous, and would have been so had not all selection been avoided. In others (such as those of α Gruis and α Trianguli), it seems extremely probable that a difference of colour between the light of the star and that of the moon has affected the photometric comparisons, leaving them, however, consistent *inter se.* Lastly, if we look to the cases of agreement rather than to those of discordance, we shall find no less than forty out of the sixty-three in question in which the results agree within one-eighth of a magnitude.

(292) One very remarkable result of our equation (C) Art. 288, ought not to be passed in silence, viz., that if the numerical values conventionally assigned to the stars be all increased by the constant fraction 0.4142 (or $\sqrt{2}-1$) *the new scale of magnitudes so arising will represent the*

distances of the respective stars to which they are ascribed, from our system, on the supposition of an intrinsic equality in the light of the stars themselves; (*i. e.* so that differences of brightness shall be merely apparent, and supposed to arise solely from differences of distance). Now, as the conventional scale which we have adopted is, after all, purely arbitrary, there is absolutely no reason other than usage, and (that hitherto a very vague and lax one) why this alteration of nomenclature should not be made. In fact, so loose is the present practiee, that it would hardly be felt as a change. α Centauri would be our normal star of the first magnitude, β Crucis of the second, κ Orionis of the third,* ν Hydræ of the fourth, and δ Volantis of the fifth; and these are the magnitudes which actually stand annexed to those stars in our catalogues respectively. The effect of such a change would be to place the nomenclature of magnitudes on a natural, or, at all events, on a photometric basis easily remembered, the relation between the magnitude and the light of any star being given by the very simple equation

$$M^2 . L = 1 \qquad \text{(D)}$$

α Centauri being taken as the unit both of light and magnitude. It is of course to be understood, that in speaking of α Centauri, which is a double star, the sum of the two individuals is intended, and the very faet of its being double, and composed of two very bright individuals, gives a sort of security against the probability of its variation in our ignorance of the causes of the phenomena of variable stars, inasmuch as there is a chance of compensation in the independent variations of two or more individuals, and at all events, the sum will vary in a less ratio to the whole if only one of the two be variable.

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* These stars are those on our list (C), in which the *sequence magnitudes* are 1.59, 2.59, 3.59, 4.59. α Centauri has, properly speaking, no sequence magnitude, and is our assumed standard. κ Orionis is ill determined in the astrometer series, as are all stars below the 3rd magnitude.

CHAPTER IV.

OF THE DISTRIBUTION OF STARS AND OF THE CONSTITUTION OF THE GALAXY IN THE SOUTHERN HEMISPHERE.

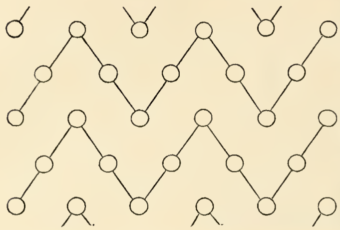
SECTION I.—OF THE STATISTICAL DISTRIBUTION OF STARS.

(293) That the comparative abundance or paucity of stars in any particular region of the northern hemisphere, and of the southern, so far as visible in our latitudes, has reference to its situation in respect of the Milky Way, is a proposition which the researches of Sir William Herschel have sufficiently established, not merely by the general aspect of the heavens when viewed with the naked eye, but also when examined with powerful telescopes in a mode which may properly be called statistical,—that is to say, by counting the number of stars in the field of view of one and the same telescope at a great number of given points in the concave of the heavens, and so estimating their comparative *populousness* in stars, in their different districts. The results of a system of observation of this nature have, as is well known, conducted him to the highly remarkable and interesting conclusion above mentioned, and to this further consequence, that all the stars visible to us, whether by unassisted vision, or through the best telescopes (such at least as are scattered, or not congregated in resolvable nebulæ, or globular or similar highly condensed clusters) belong to and form part of a vast *stratum*, or considerably *flattened* and unsymmetrical congeries of stars in which our system is deeply, though excentrically plunged, and, moreover, situated near a point where the stratum bifurcates or spreads itself out into two sheets.*

(294) It may easily be supposed that the opportunity offered of carrying out this great induction by observations made with the same telescope, similarly used in that part of the heavens inaccessible to its author, was not neglected. So soon as a knowledge of the regions where nebulæ might more especially be expected had been acquired, so as not to hazard too much by continually interrupting the sweep for the purpose of gauging (*i. e.*, counting the number of visible stars in determinate fields of view), a system of star-gauges was set on foot, at first somewhat irregularly, but after a very few sweeps, more systematically, so as to dot over the surface of the heavens, as it were with a regular tesseration of gauged or counted fields, disposed at definite and equal intervals of Right Ascension and Polar distance, viz., 10^m of time in R A, and $1° \, 30'$ of arc in N P D, as shown in the following woodcut, where the circles indicate the fields of view, and the zig-zag lines connecting them, the course of a telescope passing from one

* Phil. Trans. 1785, p. 213.

to another during a single sweep, supposing it devoted only to this object. Not that it was expected, or, indeed, considered possible actually to count so great a multitude of fields as this



plan, completely executed, would require. But it was considered, 1st, that many gauge-points must escape observation in consequence of the interference of the more important regular business of the sweep; 2dly, that *some* system was necessary to prevent confusion, and unequal observing, and that the system proposed offered the advantage of being easily carried in the memory;* 3dly, and more especially, that it was desirable to ensure an absolute impartiality in the selection of the gauge-points, which could only be done by determining beforehand where they should occur, rather than trust anything to choice, when, in all probability, more crowded fields might have obtained an undue preference in the richer regions, and more empty ones in the poorer, owing to the natural tendency to bring out into prominence anything which at the moment appears a feature.

(295) About 2300 gauges have been thus obtained, which, though leaving some blanks, in zones which had either been sufficiently swept over before the gauges were commenced, or where, for other reasons, their registry was interrupted, yet afford ample materials for testing the validity of the induction in question, and for estimating the comparative richness of every considerable district of the southern heavens. They are digested and arranged in the subsequent synopsis, in which the following particulars require to be noticed.

(296) The setting of the telescope upon the gauge-points in P D was performed without any regard to precision; the microscope being usually brought to a rough reading of 0°, 1° 30′, 3°, for the extremes and middle of the zone, neglecting the correction for the minutes of zero error, unless conspicuous enough to be troublesome, in which cases it was roughly applied. So, also, in R A, the chronometer error was habitually neglected, unless unusually great; and it would frequently happen that, owing to the interference of *an object*, a delay of one, two, or three minutes beyond the regular preconcerted times (0^m, 10^m, 20^m, &c.) would occur. For all these reasons it is probable that hardly any of the gauged fields can be accurately identified, nor is it of the slightest importance that they should be so. It suffices that they occur *about* (*i. e.*, in the immediate neighbourhood) of their intended places—in the majority of cases, no doubt, overlapping them over some considerable portion of their area. This circumstance is taken advantage of to effect a material saving of space and printing in their synoptical presentation, by referring each gauge to its nearest intended parallel of declination and decade of minutes in Right Ascension.

(297) As a preparation for this synoptic presentation of the gauges, each observation was first projected from the gauge-book on a large chart constructed for the purpose, the number of

* In the system of sweeping pursued, where zones of 3° in breadth from the equator either way to the poles were observed, the rule for the gauge points adopted, after some little hesitation, was as follows:—1st, *Even hours* (0^h, 2^h, 4^h, &c.) begin their gauges at the northern limit of the zone, *odd hours* at the southern; 2nd, Even multiples of 20^m in R A correspond to the northern limit, *odd* to the southern; 3rd, Odd multiples of 10^m (10^m, 30^m, 50^m) correspond to the middle of the zone in P D.

stars in the gauged fields being written in their proper places, like the soundings in a hydrographic chart. In so doing, *the actual observed places* (as nearly as recoverable) of the gauges were laid down. By this means it was found, as expected and intended, that in regions swept over twice or three times, blanks left in one sweep were very frequently filled up by the observations of another, so as to cover the ground of large districts with great regularity. In a great multitude of instances, however, duplicates, and even triplicates of particular gauges would occur, seldom exactly coincident in place. Wherever this happens, *neither* of the individual gauges is registered in the synopsis, but a mean is taken of all the numbers, to give the *gauge-number* corresponding to the *gauge-point* to which both the observed places belong, or that nearest to the mean of the places. When the mean so taken is a fraction, the nearest integer is set down, and when the difference from an integer is exactly $\frac{1}{2}$, the integer next less is preferred.

(298) The arrangement of the synoptic table of guages is as follows:—All the gauges are arranged on meridians and parallels. Under the heading of each meridian, denoted by $0^h\ 0^m$, $0^h\ 10^m$, &c. at the head of each double column, are entered, in the first column, the several parallels on which gauges have been observed, and in the second, the number of stars in the field corresponding, by a mean of the gauges. The parallels are 58 in number, being numbered from 0 to 57 inclusive. The parallel 0 corresponds to N P D 90°; parallel 1, to 91° 30′; parallel 2, to 93°, and so on, increasing by 1° 30′ for each unit, only that the last parallel, No. 57, corresponds to 175° 0′, instead of 175° 30′, the interval from 171° to the South Pole having been divided into two zones of 4° and 5° in breadth respectively. The dots attached to the gauge numbers indicate the number of fields, a mean of which is taken in each case.

(299) The Polar gauge is a single one, and contains 14 stars, by a mean of three observations, in each of which the true pole was in the field, though not exactly central.

Synoptic Table *of* Southern Star-Gauges, *arranged on Meridians and Parallels.*

Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.
0 h. 0 m.		0 h. 20 m.		22	5.	1 h. 10 m.		1 h. 30 m.		50	3.	30	10:	14	13.
2	8.	16	5.	26	6.	7	4.	3	5.	56	9.	32	9.	18	5.
6	3.	18	2.	34	6.	17	4.	7	5:	1 h. 50 m.		36	6.	22	11:
12	7.	20	3.	40	11.	19	14.	13	5.	3	1.	40	11.	28	7:
14	7.	28	8.	44	11.	21	8.	10	3.	7	5.	42	11.	30	4:
16	2.	36	7.	50	11.	27	5.	17	6:	21	9.	48	14.	38	5.
26	10.∴	38	7.	0 h. 50 m.		31	10.	23	9.	23	12.	50	10:	42	7.
28	7:	42	10:	17	5.	39	3.	27	7.	29	3.	52	10.	44	11.
34	13.	44	11.	20	3.	43	8:	31	5.	31	7:	54	9.	50	10.
36	7.	50	22.	23	16.	49	16.	37	9.	37	8.	2 h. 10 m.		52	16.
38	10:	52	10.	27	0.	51	9:	39	19.	41	6.	3	8.	54	21.
40	9.∴	0 h. 30 m.		43	14.	1 h. 20 m.		41	11.	43	7.	7	10.	56	· 10.
42	11.	3	4.	45	5.	4	4.	43	15.	49	7.	9	8.	2 h. 30 m.	
44	15.	7	1.	1 h. 0 m.		6	8.	49	7.	51	10:	13	13.	3	6.
48	8.	15	12.	14	4.	12	4.	51	2.	2 h. 0 m.		15	7.	13	8:
50	8:	19	13.	18	6.	14	2.	1 h. 40 m.		2	6.	17	1.	15	6.
52	10.∴	23	5.	24	3.	28	6.	10	6.	8	5:	19	6.	17	10.
54	13:	35	8.	28	7.	30	1.	12	3.	12	7.	21	5.	21	10.
0 h. 10 m.		37	8.	36	4.	36	11.	16	8.	14	1.	23	4.	23	4.
7	4.	39	11.	38	11.	38	6.	18	4.	16	9.	27	7.	25	5.
21	9.	45	14.	42	10:	40	6:	22	6.	18	6.	33	7.	27	10.
23	9.	51	12:	46	9.	42	10:	24	4.	20	5.	51	6.	29	6:
35	4.	0 h. 40 m.		50	15.	48	6.	28	5.	22	8.	53	9.	31	6.
37	11.	6	5.	52	8.	50	12:	32	8.∴	26	4:	2 h. 20 m.		33	5.
41	8.	20	9.	56	11.	52	17:	42	10.	28	5.	10	5.	37	11.
45	5.					54	12.	44	11.					39	8.

Par.	Gau.
43	8.
49	12.
51	14:
53	9.
2 h. 40 m.	
12	6:
14	11.
16	4.
22	7.
24	9.
26	9.
28	8:
32	7.
36	6.
38	14.
42	14.
48	18.
50	14.
52	9.
54	13.
2 h. 50 m.	
3	7.
7	3.
9	9.
13	15.
21	1.
23	3.
27	6.
29	10.
31	12.
41	9.
43	6.
48	0.
49	10.
53	10.
3 h. 0 m.	
4	3.
8	5.
10	9.
14	9.·.
16	9.
22	8.
24	2.
26	8.
28	2:
30	10:
38	15.
40	11.
44	12.
50	19.
52	13.
54	17.
56	13.
3 h. 10 m.	
9	9:
11	8.
13	5:
15	7:
21	9.
23	9.
25	1.
29	13.
35	26.
41	7.
49	13.
51	18.
53	13.

Par.	Gau.
3 h. 20 m.	
2	5.
6	1.
8	7:
10	9:
12	10:
22	8.
26	9.
28	6:
40	12:
48	13.
50	11.
52	8:
54	19.
3 h. 30 m.	
7	3.
9	6.
11	5.
13	8.
15	5.
25	6.
29	8.
31	13.
33	9.
41	13.
49	11.
53	19.
3 h. 40 m.	
8	6.
10	10:
12	9.
14	14.
22	12:
24	7.
30	6.
34	7.
42	9.
50	5.
52	10.
56	13.
3 h. 50 m.	
7	10:
11	9.
13	9:
17	8.
19	14.
21	3.
23	9:
25	15.
29	11.
33	9:
35	5.
36	5.
41	10.
51	9.
53	8.
4 h. 0 m.	
6	11.
8	6.
10	6.
12	12.·.
14	9.
16	10.
20	7.
22	8.
24	10.
26	9:

Par.	Gau.
28	12.
30	16.
32	4.
34	0.
40	11.
44	9.
48	10.
52	18.
54	15.
4 h. 10 m.	
7	7:
9	10.
11	12.
13	16.
17	13.
27	8:
29	4.
31	8.
33	10:
41	10.
45	13.
49	13.
51	16.
4 h. 20 m.	
8	15:
14	15.
16	15.
18	12.
22	14:
24	13.
26	11.
30	12:
32	8.
35	9.
36	9.
42	12.
44	19.
46	20.
50	14.
52	11.
54	20.
4 h. 30 m.	
9	11.
15	15.
21	10.
23	14.
25	5.
27	12:
29	13:
30	5.
31	14.
32	12.
33	12:
35	18:
39	9.
41	16.
45	19:
49	10.
51	15.
53	13:
4 h. 40 m.	
6	16.
8	12.
10	12.
16	11.
20	12.
22	16.

Par.	Gau.
24	16.
26	19.
30	10:
31	12.
35	12.
38	10.
44	14.
46	12.·.
50	5.
56	9.
4 h. 50 m.	
7	10.
11	8.
15	10.
17	14.
19	18.
21	15.
23	9.
25	14:
29	15.
30	8.
31	9.
35	12:
39	13.
45	17.
5 h. 0 m.	
8	9.
10	17.
12	9.
14	16.
18	13.
22	11:
24	15.
28	17.
30	13.
31	9.
35	11.
42	19.
52	21.
54	11.
57	22:
5 h. 10 m.	
9	18.
21	15:
23	22.
31	17.
33	17:
35	20.
39	17.
51	11.
5 h. 20 m.	
6	8.
8	12:
20	20.
24	14.
35	21:
38	22.
50	5.
5 h. 30 m.	
13	13.
15	18.
19	17:
21	22.
25	14.
27	14:
31	14.

Par.	Gau.
32	24.
33	17:
35	18:
39	22:
41	18.
51	10.
53	8.
55	15.
5 h. 40 m.	
14	23.
18	21.
20	30:
21	23.
22	22.
28	14.
29	22.
35	25.
36	13.
41	17.
42	22.
52	8.
5 h. 50 m.	
15	14.
16	37.
17	31.
19	17.
21	26.
25	17.
27	13:
29	12.
31	15:
33	17:
35	20.
41	20:
51	16.
6 h. 0 m.	
8	10:
10	19.
12	20.
14	31:
16	27.
18	24.
19	26.
22	25.
26	17.
27	26:
28	15.
29	30.
34	23.
38	8.
40	19.
48	19.
50	10:
52	19.
54	29:
57	9.
6 h. 10 m.	
9	28.
13	16.
15	40.
16	35.
19	29:
21	34:
23	10.
25	28:
31	26:
33	18.

Par.	Gau.
35	18:
37	16.
43	25.
49	25.
51	28.
6 h. 20 m.	
10	18.
12	28.
14	27.
15	35.
16	41:
20	35.
22	28.
26	17.
27	33.
28	17.
31	36.
34	26.
38	21.
39	23.
42	26.
45	24.
46	26.
50	20.
52	17.
56	6.
6 h. 30 m.	
9	39.
13	32.
15	35:
19	37:
21	43.
23	20:
25	25.·.
27	28:
31	37.
33	38.
35	29.
37	15.
41	20.
45	25.
49	22.
51	17.
53	14.
55	15.
6 h. 40 m.	
8	35.
10	43.
12	34.
14	45.
15	35.
16	58.
18	54.
24	36.
26	29.
36	25.
40	20.
43	17.
46	35.
48	28.
50	20.
52	16.
57	20.
6 h 50 m.	
9	43.
11	32.
13	43.

Par.	Gau.
15	60:
19	42:
23	27.
27	36.
31	26.
33	35:
35	24:
41	20:
46	19:
49	18.
52	11:
57	20.
7 h. 0 m.	
10	56:
14	63.
16	60.·.
19	48.
20	77:
21	46:
23	32.
26	45:
27	42.
28	33:
42	25.
43	22.
44	26.
45	20.
46	25.
48	17.
50	18.
52	13.
54	22.
57	17.
7 h. 10 m.	
9	60.
11	50.
13	80.
15	50.
19	75.
21	52.
23	39.
28	60.
33	30.·.
35	30.
41	20.
43	24:
49	19.
51	10.
7 h. 20 m.	
8	50.
10	60.
12	65.
14	74.
16	50:
18	72.
21	73.
24	39.
27	43.
29	42.
30	49.
42	23.·.
45	25.
48	16.
49	15.
51	21.
7 h. 30 m.	
9	200.

Par.	Gau.
11	59.
13	54.
14	120.
15	140.
19	53.
21	68.
23	55.
25	46.
27	57.
29	38:
35	37.
39	30.
41	18.
43	25:
45	31.
47	24:
49	25.·.
55	27.
7 h. 40 m.	
10	48.
14	88.
16	105.
19	55.
21	40.
40	29.
42	33.
52	26.
53	13.
54	18:
7 h. 50 m.	
9	54:
15	80.
19	84:
23	36.
25	44.·.
27	24.
29	51.·.
31	61:
33	30:
35	39:
49	13.
8 h. 0 m.	
8	41:
10	66.
12	69.
14	66.
18	65.
19	80:
21	82.
22	96.
23	50.
24	70.·.
25	36.
28	74:
29	64:
32	43:
34	14:
35	26.
37	46.
39	33.
42	34.
45	37.
46	27:
48	18.
51	22.
52	35.
54	16:

Par.	Gau.
8 h. 10 m.	
13	70.
15	61.·.
19	71:
21	69:
22	200.
23	60.
24	48.
25	27:
27	21:
29	49::
30	48.
31	60:
32	46.
33	16.
35	30:
37	37.
39	45.
41	45.·.
43	23.
45	28.
47	37:
49	17:
53	12.
8 h. 20 m.	
10	45:
14	48:
15	58.
16	52.
22	70.
24	50.
26	45.
30	36:
31	55.
33	20.
34	41.
36	56.
37	37.
40	22.
42	24:
44	32:
45	37.
46	44.
48	32.
50	20.
51	24.
52	26.
54	10.
56	17.
8 h. 30 m.	
11	24.
13	60.
15	37:
17	70.
19	69.·.
20	75.
23	71:
25	53.
27	51.
29	46.·.
31	73.
33	52.
34	15.
35	37.
37	54:
39	60.
41	43:
43	34:
45	53.
47	43:
51	18.
55	22.
8 h. 40 m.	
8	32:
10	37.
14	31.
15	35:
16	42.
18	29.
22	30.
24	67.
27	21.
28	27.
32	55.
34	48.
38	80:
40	46.
42	44.
44	41:
45	49:
46	33.
48	39.
50	31.
51	29.
52	29.
8 h. 50 m.	
11	17.
13	22.
15	28:
17	48.
19	40::
25	42.
27	17.
29	21:
30	9.
31	41:
33	60:
35	70.
37	68.
39	62:
43	32:
45	54:
47	44:
51	17.
53	47.
9 h. 0 m.	
10	24.
12	19.
14	37:
16	28.
18	47:
19	34.
20	45.
22	31.
24	43.
25	54:
26	75.
27	34.
28	33.
34	46:
36	81:
38	97.
42	42.
44	59.
46	60.
48	31.
49	27.
52	25.
54	25.
57	10.
9 h. 10 m.	
9	10.
13	20.
15	22.·.
17	38.
19	46.
20	28.
25	56.
27	39.
31	9.
33	49.
41	67:
51	38.
53	41.
55	33.
9 h. 20 m.	
10	21.
12	25.
16	27.
18	32:
28	30:
29	45.
31	25.
32	12:
34	58.
36	120.
40	68:
42	55.
50	34.
9 h. 30 m.	
11	16.
13	17:
15	19:
17	35:
19	21:
21	38:
23	36.
25	48.
27	24.
29	59.·.
31	15.
33	120.
35	85.
37	76:
39	93.
41	65.
45	50.
53	23.
55	22.
9 h. 40 m.	
12	21.
14	13:
15	22.
18	28.
20	23:
25	36.
28	33.
30	85::
32	43.
34	125.
38	130.
52	14.
54	34.
9 h. 50 m.	
9	20.
11	19.
13	15.
15	23:
17	27.
19	26.
25	21.
27	29.
29	54.
31	95:
33	103.
37	100.
39	125.
41	150.
45	53.
51	19.
53	23.
10 h. 0 m.	
12	14.
14	17:
18	18:
23	29.
24	22.
28	30:
30	50.
32	70.
36	86:
38	85.
40	200.
42	80.
45	39.
49	42.
51	15.
52	30.
54	27.
10 h. 10 m.	
13	11.
15	15:
19	15.
23	26.
25	39.
29	51:
31	90.
39	106.
41	140.
43	70.
45	39.
51	21.
52	32.
55	25.
10 h. 20 m.	
16	24.
18	27.
20	29.
26	25:
30	36.
32	44:
39	144.
44	60.
45	69:
48	68.
49	41.
50	33.
54	27.
10 h. 30 m.	
9	8.
15	23:
23	29.
25	28.
29	31.
37	98.
39	224.
43	69.
45	80.
46	74.
51	23.
55	27.
10 h. 40 m.	
14	16:
18	14.
24	16.
28	20.
29	25.
30	33.
36	120.
45	81:
47	63.
48	38.
50	42.
10 h. 50 m.	
9	15.
15	11.
23	28.
25	23:
31	33:
35	48.
37	104:
43	56:
44	49.
45	90.
47	55.
49	29.
51	12:
53	37.
11 h. 0 m.	
10	16.
16	19.
26	17.
29	36.
30	34:
31	38.
32	41.
34	48.
36	68.
38	190:
44	37.
45	99:
50	29.·.
52	19.
53	37.
54	18.
11 h. 10 m.	
9	13:
15	16.
23	16.
25	24.
35	67.
37	61.
43	14.
47	64:
49	36.
51	11.
11 h. 20 m.	
14	8.
23	19.
24	17.
28	15.
30	28.
31	38.
36	47:
39	250.
42	40.
45	92.
46	75.
48	31.
50	31.
52	56.
56	20.
11 h. 30 m.	
7	8.
15	9.
29	24.
31	46:
33	62.
39	140.
43	54:
46	53.
48	42.
49	23:
51	34.
53	35.
55	22.
11 h. 40 m.	
6	9.
10	4.
24	7.
26	26.
32	53.
34	49:
36	36.
42	85.
45	80.
48	47.
50	11.
57	29.
11 h. 50 m.	
7	6.
9	12.
23	20.
29	21.
31	45.
33	51.
35	43.
43	88.
44	94.
45	72.
53	35.
55	15.
57	29.
12 h. 0 m.	
16	9.
21	14.
28	33.
30	38:
34	44.
36	38.
42	120.
44	61:
45	89.
46	98.
52	15:
54	25.
12 h. 10 m.	
7	5.
15	10.
25	13.
29	22:
30	29.
31	41.·.
33	53.
37	51.
43	99:
47	7.
55	24.
12 h. 20 m.	
6	9.
20	27.
30	26:
31	50.
32	60.
34	55.
38	67.
42	9.
49	48.
54	12.
12 h. 30 m.	
7	6:
19	19.
25	11.
29	13.
31	45.
37	72.
43	48.
44	7.
47	42.
53	9.
55	36.
12 h. 40 m.	
6	5.
8	10.
18	16.
20	13.
24	12.
28	26:
36	63.
42	38:
44	68.
48	36:
49	20.
50	17:
54	24.
12 h. 50 m.	
7	10.
8	1.
21	14.
29	51.
31	24.
37	80.
47	77.
51	3.·.
53	25.
13 h. 0 m.	
6	5.
8	7.
14	10.
30	28:
32	45:
36	48.
38	115.
40	90.
42	85.
48	66.
50	29:
52	30:
54	17.
56	24.
13 h. 10 m.	
7	16.
31	34.
33	42.
37	62.
39	54.
42	118.
43	103.
47	95:
51	40.
53	39.
55	43.
13 h. 20 m.	
6	4.
16	12.
28	17.
32	46.
36	55.
38	65.
40	105.
44	59.
46	100.
48	62:
50	44.
52	45.
13 h. 30 m.	
15	14.
25	18.
29	26.
33	50.
37	66:
39	65:
45	35.
47	77.
49	57.
51	43.
53	44.
13 h. 40 m.	
6	6.
8	7.
14	9.
16	14.
30	30.
32	33.
38	72.
40	90.
42	105.
44	65.
48	68:
50	39.
52	24.
54	18.
56	24.

Par.	Gau.
13 h.	50 m.
15	18.
29	30.
35	30.
39	60:
43	88.
45	55.
47	70.
49	32:
51	33.
53	42.
55	23.
14 h.	0 m.
6	11.
14	10.
16	16.
24	17.
26	27.
28	29.
32	33.
36	18.
42	250.
44	52.
48	56:
50	36:
52	43.
54	23.
14 h.	10 m.
7	5.
15	15:
32	36.
43	106.·.
45	29.
47	74.
51	34.
14 h.	20 m.
10	14.
14	15.
16	9.
30	28.
34	37.
36	46.
38	41:
41	87:
44	61.
46	53:
50	43.
53	23.
14 h.	30 m.
8	11.
9	21.
15	12:
31	24.
37	38.
43	70.
45	49.
47	77.
49	62.
51	53.
53	26.
14 h.	40 m.
7	14.
8	19.
14	16.
16	12.
32	53.
36	52.
38	28:
40	22:
44	93.
48	62:
52	52.
54	26.
14 h.	50 m.
5	13.
9	19.
15	14.
27	53.
31	34.
33	50.
37	40.
39	20.
43	46.
45	78.
47	85.
49	53.
51	48.
15 h.	0 m.
2	13.
6	7.
8	14.
10	17.
14	19.
16	23.
24	30.
28	45.
38	25.·.
39	20.
40	37.
42	32.
44	160.
46	69:
48	49.
50	43.·.
53	18.
54	15.
15 h.	10 m.
5	17.
7	13.
13	18.
15	8.
27	55.
31	38.
33	49.
35	77:
37	48.
39	18.
41	60.
43	93:
45	85:
47	74:
51	57.
15 h.	20 m.
8	16.
12	14.
24	20.
30	38.
32	39.
36	47.
40	72:
44	74.·.
48	52:
50	41.
52	36.
56	30.
15 h.	30 m.
3	13.
9	21.
13	19.
15	35.·.
23	24.
33	65.
36	54.
37	26.
39	103.
45	69.
46	67.
47	65.·.
51	50.
53	20.
15 h.	40 m.
2	5.
6	12.
10	18.
14	10.
16	20.
22	46.
24	23.
34	36.
38	86.
46	58:
48	54.
50	41:
53	26.
54	22.
15 h.	50 m.
3	14.
7	17.
9	15.
15	18.·.
23	32:
27	26.
33	26.
37	60.
45	81.
47	54:
49	32.
51	44:
53	35.
16 h.	0 m.
8	17:
12	16.
14	16:
16	25.
22	45.
24	10.
26	15.
32	25.
36	200.
40	77.
44	70:
46	65.
48	70.
52	25:
54	22.
56	24.
16 h.	10 m.
3	14.
7	8:
9	13.
11	28.
13	0.
15	13:
23	11:
33	50.
43	76.
45	81.
49	31.
16 h.	20 m.
2	14.
6	16.
10	11.
11	1.
14	13.
16	4.
24	17.
30	40.
34	56.
39	49.
46	36.
50	42.
52	29.
53	20.
54	21:
16 h.	30 m.
3	13.
7	17.
9	12:
11	24.
13	12.
15	16:
19	20.
23	52:
31	150.
43	70:
45	40.
49	35.
51	35.
53	30.
16 h.	40 m.
8	12.·.
12	17:
14	11:
20	50.
22	70.
24	56.
36	71.
44	60.
48	32.
52	32.·.
56	21.
16 h.	50 m.
3	16.
7	22.
9	5:
11	12.
13	37.
15	34:
23	45.
35	53.
39	68.
45	44.
47	53.
49	48.
53	22:
17 h.	0 m.
2	11.
6	20.
10	29.
12	60.
14	37.
16	50.
18	42.
22	40.
24	30.
28	60.
36	80.
38	41.
42	61.
46	45::
50	43.
52	16.
53	19.
54	17.
17 h.	10 m.
3	7.
7	25.
9	15.
13	48.
15	15.
39	37.
43	58.
45	53.
47	37.
49	45.
51	12:
17 h.	20 m.
6	1.
8	19:
10	50.
12	66.
20	0.
22	27.
40	36.
44	34.·.
48	38.
52	28.
54	11.
56	15.
17 h.	30 m.
5	6.
6	1.
7	13:
8	24.
9	52:
13	21.
15	30.
23	59.
31	100.
39	32.
43	37:
45	40:
47	38.
49	37.
51	24:
53	33.
17 h.	40 m.
2	29.
6	16.
8	21.
10	72.
12	27.
19	200.
20	130.
22	*neb.*
38	62.
42	30.
46	35.·.
50	31.
53	12.
55	14.
17 h.	50 m.
9	18.
11	43.
14	*neb.*
19	*innum.*
27	150.
31	84.
39	37.
41	29.
42	23.
45	54:
47	45.
18 h.	0 m.
4	12.
6	14:
8	23:
10	53:
16	23.
19	*innum.*
24	110.
26	17.
30	63.
34	50.
38	36.
40	31:
42	50.
43	19.
44	42:
46	43.
48	26.
52	20.
56	17.
18 h.	10 m.
5	8.
7	22.
8	50.
9	80.
10	49.
19	*innum.*
20	*do.*
21	*do.*
22	*do.*
27	60.
31	76.
43	35.
44	28.
45	31:
53	23.
18 h.	20 m.
6	18:
7	1.
28	55.
32	40.
38	36.
42	33.
44	38.
46	34:
50	25:
54	25.
18 h.	30 m.
4	*rich.*
5	150.
7	65.
9	53.
19	96.
21	65.
23	56.
27	46:
31	40.
35	69.
37	51.
39	28.
41	19.
43	28.
47	37.
51	16.
53	100.
18 h.	40 m.
8	39:
10	40.
18	72.
26	29.
36	34.
38	29.
42	29.
44	31.
45	22.
48	31.
54	9.
18 h.	50 m.
7	66.
19	39.
27	36.
31	42.
35	37.
43	25.
45	27.
49	28.
52	16.
19 h.	0 m.
6	53.
10	63.
14	72.
28	47:
32	22.
34	34.
38	21.
40	13.
42	23:
46	31.
48	15.
50	21.
51	19.
52	24.
54	17.
56	11.
19 h.	10 m.
7	57.
13	80.
33	23.
37	36.
41	15.
45	18:
19 h.	20 m.
8	39.
12	65.
32	32.
36	31:
38	20.
42	23.
44	20:
46	20:
48	25.
50	26.
19 h.	30 m.
13	31.
33	33.
35	21.
43	20.
49	20.
51	23.
53	11.
55	13.
19 h.	40 m.
14	29.
22	17.
34	27:
42	12.
44	21.
19 h.	50 m.
13	24.
35	25.
43	18.
47	29.
49	14.
20 h.	0 m.
12	32.
20	28.
24	18.
30	15.
36	17:
40	16.
44	16.
48	18:
49	18.
52	19.
54	10.
20 h.	10 m.
13	19.
21	29.
27	22.
31	13.
41	18.
45	17.
47	12.
49	19.
53	17.

Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.	Par.	Gau.
20 h.	20 m.	20 h.	50 m.	21 h.	20 m.	42	10.	22 h.	20 m.	22 h.	50 m.	47	9.	23 h.	40 m.
20	20.	25	16.	2	12.	50	14.	4	6.	3	7.	53	20.	4	13.
26	22.	27	9.	20	19.	52	9.	28	3.	25	7.	23 h.	20 m.	8	7.
32	13.	29	21.	24	6.	54	22.	30	7.	29	6.	6	2.	18	7.
34	16.	35	21.	26	18.	21 h.	50 m.	36	6.	35	9.	16	6.	26	7.
38	15.	43	15.	40	17.	25	4.	40	17.	41	6.	22	4.	28	8.
40	22.	48	13.	44	20.	27	14.	46	13.	45	10:	24	4.	30	4.
42	17:	49	12.	48	19.	35	13.	50	15:	47	9.	30	7:	38	7:
46	20.	21 h.	0 m.	50	12.	41	13.	52	13.	49	10.	34	6.	40	12.
50	20:	4	12.	53	14.	49	15.	54	6.	51	17.	36	15.	42	12.
54	17.	22	11:	21 h.	30 m.	51	9.	22 h.	30 m.	23 h.	0 m.	40	14.	44	12.
20 h.	30 m.	26	11.	3	11.	22 h.	0 m.	3	9.	8	5.	44	7.	46	8.
13	14.	28	12.	21	18.	2	12.	21	8.	18	1.	48	12:	50	10:
21	23:	30	15.	25	9.	24	5.	25	7.	22	2.	50	13.	54	11.
25	8.	38	17.	27	15.	34	5.	35	11.	24	2.	52	13.	56	18.
27	9.	42	15.	29	14.	40	12.	41	14.	26	8.	54	13.	23 h.	50 m.
43	14:	44	13.	35	7.	42	10.	45	15:	28	6.	23 h.	30 m.	7	3.
45	9.	46	19.	43	19:	44	14.	47	13.	38	14.	3	11.	13	8.
47	16.	50	13.	45	10.	48	9.	49	14.	40	13.	13	0.	15	9.
53	21.	21 h.	10 m.	47	18.	50	9.	53	14.	42	10.	17	6.	17	5.
20 h.	40 m.	3	12.	49	13.	52	18.	22 h.	40 m.	46	5:	21	10.	21	5.
20	11:	21	15.	51	7.	22 h.	10 m.	2	5.	50	15:	27	7.	35	9.
24	14.	25	7.	53	10.	21	15.	20	17.	52	10:	29	6:	37	7.
36	21:	41	9.	21 h.	40 m.	27	10.	26	8:	54	10.	35	3.	39	10.
48	14.	43	10.	22	17.	29	18.	36	5.	56	10.	37	6.	41	7.
50	19.	45	13.	26	12.	39	14.	38	9.	23 h.	10 m.	39	14.	43	8.
51	13.	49	22.	30	10.	41	8.	44	13.	17	7.	41	18.	45	12.
52	14.	51	14.	40	10.	53	18.	48	13:	35	11.	45	11.	49	11.
		52	16.	41	7.			50	9.	37	14.	47	8.	53	19.
								52	9.	41	26.	49	16.		
										45	8:	51	14.		

(300) In order to examine how far the induction alluded to in Arts. (293) and (294) is borne out by the system of observations above described, the following process was instituted. The poles of the great circle marking on a celestial globe the medial line of the Milky Way, which may be called the Galactic circle, were found, and their places ascertained to be in $0^h\ 47^m$ R A and 116° 0′ N P D for the southern pole, and $12^h\ 47^m$ R A, 64° 0′ N P D for the northern. With these poles, a series of parallels to the Galactic circle were described on an 18-inch celestial globe, dividing the heavens into zones 15° each in breadth, six on the south, and six on the north side of the Milky Way; and the points of intersection of these with the meridians of $0^h\ 0^m$, $0^h\ 20^m$, $0^h\ 40^m$, &c. being read off in N P D, by the aid of the brass meridian arc (a process quite accurate enough for the purpose), every such point was transferred to the chart mentioned in Art. (297), containing the actual projections of all the observed gauges. These points were then connected by regular curves, which are, consequently, the projections of the galactic parallels in question, the spaces between them being the projections of the zones into which they divide the surface of the sphere.

(301) This done, the next step consisted in counting the number of fields of view actually laid down on the charts in the region occupied by each zone, seriatim; and in adding together into one sum the numbers of stars therein observed, or the gauge numbers as they actually occurred on the chart, and the following are the results obtained:—

(302) In the oval representing the circle of 15° radius surrounding the southern pole of the Galactic circle, were found to have been observed forty-three fields, containing in all 260 stars, which gives for the average density of stars in this region of the heavens 6·05 stars to a field of 15′ in diameter, visible in the 20-feet reflector with the usual sweeping power 180.

(303) In the zone comprised between the parallels of 15° and 30° Galactic south polar distance 144 gauges were found to occur, containing an aggregate of 953 stars, or 6·62 stars to a field.

(304) In the zone comprised between 30° and 45° were observed 218 gauges containing 1980 stars, which gives an average of 9·08 stars to a field.

(305) In the zone from 45° to 60° were found 375 gauges containing 5060 stars, being 13·49 stars to a field.

(306) From 60° to 75° are found to have been observed 472 gauges containing 12409 counted stars, whence the average of 26·29 stars to a field.

(307) From 75° to 90°, being the zone immediately adjacent to the Milky Way on the south side, and containing half its breadth, 442 gauges are registered containing 26105 stars. Among these occur some gauges in which the stars are set down as "innumerable," or so crowded as to be impossible to count them without bestowing more time and care than the nature of the object in view was judged to require. These are taken when they occur at 200 stars to the field, which is certainly not an excessive estimate. There are, however, not above five or six gauges in this predicament. The average density of stars in this zone, according to the numbers above stated, is 59·06 stars to a field.

(308) A zone of 3° in breadth bisected throughout by the Galactic circle, or extending $1\frac{1}{2}°$ on its north, and as much on its south side, was found to include eighty-four gauges containing 6258 stars, giving an average of 74·50 stars to a field. The average would have been much higher if, instead of following the course of this circle, a zone of equal breadth pursuing the irregular line of maximum intensity of the Milky Way had been chosen, which in some places deviates by several degrees from the great circle which expresses its general situation. Judging from the course of the counted gauges only, the mean density of stars in the medial line of the actual galaxy in that part I have observed would be somewhere about ninety stars to the field, but this must be considered as exclusive of the more densely clustering masses.

(309) On the northern side of the Galactic circle, the numbers of gauges registered in my observations, with their respective aggregates and averages of stars, run as follows:—

Zone.	Number of Gauges observed.	Aggregate of stars counted.	Average of stars in a field.
90° to 105° Galactic S P D	321	16461	51.28
105° to 120° „ „	195	4576	23.47
120° to 135° „ „	68	982	14.46
135° to 150° „ „	21	162	7.71

(310) Nothing can be more striking than the gradual but rapid increase of density on either side of the Milky Way as we approach its course, and the reproduction of nearly the same law of graduation on the north side which holds good on the south, so far as the comparative paucity of the gauges taken in that direction allow us to judge. On the whole, this induction, founded as it is on the actual enumeration of 68948 stars contained in 2299 fields, must be admitted as decisive of the specific point in question, and as completing the evidence to the same effect afforded by Sir William Herschel's observations * in the northern hemisphere.

* I have purposely abstained from mixing up in any way the gauges observed by myself with those recorded

(311) Were we to calculate upon these averages the number of stars *visible enough to be distinctly counted in the 20-feet reflector* in one hemisphere, throwing together into one the gauges observed in corresponding zones north and south of the Galactic circle, by way of obtaining a broader average, we should find it to be 2665786; and for the two hemispheres, supposing them equally rich 5331572, or somewhat less than $5\frac{1}{2}$ millions. That the actual number is much greater there can be little doubt, when we consider that large tracts of the Milky Way exist so crowded as to defy counting the gauges, not by reason of the smallness of the stars, but their number. As, for example, in the zone 141°....143°, between the 15th and 16th hour of R A ($\int$599); in the rich masses of Sagittarius and Antinous mentioned in Arts. (321), (322); and in many other localities.

(312) It will of course be understood, and a very superficial inspection of the synopsis of gauges above given, suffices to show that great local departures from the general law of distribution indicated in this table occur, and *that* nowhere more remarkably than in the Milky Way itself, whose inequalities of density and irregularities of breadth and structure are most conspicuous and singular. On this head I shall presently have more to say. But, with exception of these portions of the galaxy itself, I find nothing in the smallest degree meriting to be regarded as *systematic* in any part of the heavens which I have examined, as respects these deviations from perfect regularity. On the contrary, so purely local are they, that on a careful revisal of the whole chart, I find it difficult to specify any considerable areas over which an average density of stars prevails materially differing from what might be expected from the law of density (regarded as a function of the Galactic polar distance) indicated in the last article. As respects mere local inequalities, the occasional occurrence of clusters of stars of the 7th and 8th classes remote from the Milky Way, may be regarded as fully compensated by the occurrence (almost as rare) of fields of view totally devoid of any perceptible star. When such a field has occurred in sweeping, it has usually been noticed as a thing worthy of special remark, and its place taken and registered *as an object*. The following is a list of places where such blanks occur.

R A.			N P D.			Sweep.	R A.			N P D.			Sweep.	R A.			N P D.			Sweep.
h.	m.	s.	°	′			h.	m.	s.	°	′			h.	m.	s.	°	′		
0	50	—	129	32	—	638	2	29	—	126	4	—	635	16	8	24	114....117			453
1	3	45	129	45	—	638	2	50	—	96	1	—	739	16	10	—	111....114			588
1	8	44	123	3	—	494	2	57	14	131	3	—	638	16	10	34	126	59	25	460 }
1	35	—	94	42	—	739	9	34	36	72	31	—	688†	—	—	47	—	60	25	462 }
1	38	—	125	23	—	635	10	50	32	166	15	40	548	16	12	45	109	7	—	722
1	46	—	100	53	—	650	16	6	0	126	39	57	461	16	12	45	113	34	—	793‡
1	58	—	125	37	—	635*	16	6	27	126	59	35	462	16	12	—	112	55		588

by him, in order to give the corroboration of his views on this important subject the force of a perfectly independent result, obtained from a diametrically opposite point of view, and resting on a series of observations hardly less extensive than his own.

* Totally blank, not the smallest star, and the heavens here are singularly void of stars: many fields are blank all but one or two stars 15m. N.B.—In this zone also from $0^h\ 30^m$ to $1^h\ 39^m$ occur many fields with one or two stars only, of the 15th or 16th magnitude.

† In this zone (72°....75° N P D) between 10^h and $11^h\ 40^m$ occur several blank fields.

‡ This blank extends from 113° 52′ to 113° 25′ in P D, and over a considerable space in R A.

R A. h. m. s.	N P D. ° ′	Sweep.	R A. h. m. s.	N P D. ° ′	Sweep.	R A. h. m. s.	N P D. ° ′	Sweep.
16 14 —	113 3 to	588*	16 30 0	113 53 —	793	17 23 —	98 45 —	721
	114 11		— — 22	— 48 —	474	17 23 1	115 40 30	474
16 21 —	113 10 —	588	16 37 —	110 58 —	588	17 23 41	115 57 —	453
16 21 15	113 25 —	793	16 43 —	105 17 —	699	17 24 40	115 50 30	474
16 23 9	114 24 23	474	17 11 45	116 42 —	723	17 29 —	99 22 —	721‡
16 23 9	114 4 53	474	17 17 30	116 46 —	723	17 53 28	94 46 57	608
16 23 —	112 51 to	588	17 18 30	116 38 to	723	18 7 4	97 44 18	609
	113 51			116 54		18 13 27	97 9 —	609
16 25 32	114 14 23	474	17 19 10	116 11 —	453	23 43 —	127 29 —	636
16 27 —	113 0 —	588†	17 21 9	116 7 46	453	23 44 —	128 3 —	636
16 27 21	113 59 24	474						

(313) Hitherto we have considered merely the total numbers of stars in our gauged fields, without reference to their classification by magnitudes. In counting the gauges, however, not only the total numbers were set down, but those of all the several magnitudes down to the 11th inclusive, and even of the estimated half magnitudes intermediate, so that we are not left without data for entering with considerable detail into this part of the general inquiry. To this end the numbers of all the stars of the several magnitudes below specified, occurring in the registered gauges, distributed in the respective zones of Galactic polar distance, have been added together and collected into sums: and the following table offers a synoptic view of the results of this operation, in which also (for comparison's sake) those which have reference to stars of mixed magnitudes are inserted.

Zones of Galactic S P D.	No. of Observed Fields in Zone.	Total Number of Stars Registered.						Deduced Number of Stars per 100 Fields.					
		Above 8 m.	8 m. and 8′ m.	9 m. and 9′ m.	10 m. and 10′ m.	11 m. and 11′ m.	12 m. and under.	Above 8 m.	8 m. and 8′ m.	9 m. and 9′ m.	10 m. and 10′ m.	11 m. and 11′ m.	12 m. and under.
0° to 15°	43	2	0	3	20	31	204	5	—	7	47	72	474
15 .. 30	144	7	9	32	54	80	771	5	6	22	38	56	535
30 .. 45	218	10	16	38	86	165	1665	5	7	17	39	76	764
45 .. 60	375	11	22	68	158	410	4391	3	6	18	42	109	1171
60 .. 75	472	13	30	109	268	758	11231	3	7	23	57	161	2378
75 .. 90	442	28	48	170	391	1096	24372	6	11	38	88	248	5515
90 .. 105	321	12	26	90	234	689	15410	4	9	28	70	215	4802
105 .. 120	195	12	13	40	90	236	4185	6	8	21	46	121	2145
120 .. 135	68	2	1	14	35	102	828	3	1	21	51	130	1240
135 .. 150	21	0	1	1	5	17	138	—	5	5	24	81	656

(314) On a general view of this table it appears that the tendency to greater frequency, or the increase of density in respect of statistical distribution, in approaching the Milky Way, is quite

* In all this interval of P D (besides the radius of the field at either end), not the smallest star. Sky perfectly pure and superb.

† Many other blank fields hereabouts.

‡ One star 17m seen with long attention.

imperceptible among stars of a higher magnitude than the 8th, and except on the very verge of the Milky Way itself, stars of the 8th magnitude can hardly be said to participate in the general law of increase. For the 9th and 10th the increase, though unequivocally indicated over a zone extending at least 30° on either side of the Milky Way, is by no means striking. It is with the 11th magnitude that it first becomes conspicuous, though still of small amount when compared with that which prevails among the mass of stars of magnitudes inferior to the 11th, which constitute sixteen-seventeenths of the totality of stars within 30° on either side of the Galactic circle.

(315) Two conclusions seem to follow inevitably from this; viz.—1st, That the larger stars are really nearer to us (taken *en masse*, and without denying individual exceptions) than the smaller ones. Were this not the case, were there really among the infinite multitude of stars, constituting the remoter portions of the galaxy, numerous individuals of extravagant size and brightness, as compared with the generality of those around them, so as to overcome the effect of distance and appear to us as large stars, the probability of their occurrence in any given region would increase with the total apparent density of stars in that region, and would result in a preponderance of considerable stars in the Milky Way, beyond what the heavens really present, over its whole circumference. 2dly, That the depth at which our system is plunged in the sidereal stratum constituting the galaxy, reckoning from the southern surface or limit of that stratum, is about equal to that distance which on a general average corresponds to the light of a star of the 9th or 10th magnitude, and certainly does not exceed that corresponding to the 11th.

SECTION II.—OF THE GENERAL APPEARANCE AND TELESCOPIC CONSTITUTION OF THE MILKY WAY IN THE SOUTHERN HEMISPHERE.

(316) The Milky Way, where it passes through the constellation Monoceros, is of great breadth; and is uniform and starless in appearance. Its axis nearly bisects the interval between Sirius and Procyon, as it does also the smaller intervals between *f* and *h Monocerotis*, between *s* and *m* of the same constellation, and (less exactly) between γ Canis and *n Monocerotis*. It crosses the equinoctial in $6^h\ 54^m$ R A (for 1800). The uniform, and (to the naked eye) starless portion continues to about the southern tropic, in the parallel of ξ *Argûs*. At this point of its course, it subdivides, sending off, in the first instance, a narrow and winding branch on the preceding side, which may be considered as originating at *m Puppis*, and whose course may be traced nearly along its medial line by the stars *p*, *f*, *e*, *c*, *a*, N *Puppis*, as far as γ *Argûs*, which it involves, and where it terminates rather abruptly. ζ *Argûs* is involved in this branch near its following border, where it makes an elbow, and acquires considerable intensity. See Plate XIII. fig. 1.

(317) After sending off this branch, the main body of the Milky Way pursues its course southwards to the parallel of ω *Puppis* and *a Mali*, where it diffuses itself broadly, and again subdivides, the preceding stream going on with a great increase of intensity to *q Puppis*, where it is suddenly broken off, but resuming, continues more feebly till it finally terminates in a rounded mass, in which are involved the stars *a*, *b*, *f*, *g*, *Velorum*. The following stream, which is faint

and indefinite, attains and involves λ *Argûs*, where it also terminates. Some faint traces of a fourth branch extending to and involving ψ, may also be suspected.

(318) At this part of its general course, the continuity of the Milky Way may be said to be almost entirely broken off, insomuch that a line may be drawn through χ *Argûs*, E, D, *e* and *y Velorum*, cutting across its whole extent, and hardly perceptibly affected by its light, and forming, as it were, a gap between each of the branches above specified, and their further continuation.

(319) On the following side of this gap, viz., at δ *Argûs*, at M, L *Velorum*, and at U *Velorum*, streams originate, more or less corresponding to the aforesaid branches, but more diffused, faint, and indefinite, forming altogether a broad and fan-shaped effusion, whose widest opening extends from δ *Argûs* to *q Velorum*, or about 18° in breadth, and which converges, increasing in intensity as it narrows (evidently indicating a foreshortening by perspective), till it attains a minimum of breadth between *z* 1 + *z* 2 *Carinæ* and λ *Centauri*, which stars form the promontories or head-lands (so to speak) of a small, but very strongly marked and sharply cut semicircular bay, half way between η *Argûs* and α *Crucis*, on the southern side of the Milky Way, whose breadth here does not exceed 4 or 5 degrees, or even less, if measured across to the concavity of a corresponding but less conspicuous indentation on the north side, having δ *Crucis* for the centre of curvature of its contour. In all the region from η *Argûs* to this point, the Milky Way is exceedingly intense. From the star last named it throws off a short spur towards ι *Argûs*, which terminates in a very intense rounded nebulous knot, at a point marked o, in Bode's map, which is the cluster h. 3224 = Δ 297, in which are the small stars Nos. 3441, 3445, 3447 of the B. A. Catal., unless, indeed, a faint effusion involving ι *Argûs*, and stretching onwards towards ε, be regarded as connecting the Milky Way with the cluster h. 3111, near B *Carinæ*, which is very conspicuous to the naked eye as a round nebulous patch, and which includes the stars Nos. 2686, 2687, 2694, and 2695 B. A. C.

(320) Immediately after the contraction between λ *Centauri* and δ *Crucis*, the Milky Way suddenly expands so as to include the southern half of the cross and the northern portion of *Musca*, whence it proceeds to β *Centauri*, embracing in this wide expansion that singular vacuity on the south following side of the cross, called the "Coal-sack," a pear-shaped oval, whose greatest length is about 8°, and breadth 5°, the longer axis being nearly parallel to the line joining α and β Crucis, which line is very nearly a tangent to the north-preceding portion of its circumference. As this is always regarded by voyagers and travellers as one of the most conspicuous features of the southern sky, it may not be irrevelant to state a few particulars as to its telescopic constitution. It is by no means entirely devoid of stars, the lowest gauges recorded being 9 and 7, and no *blank fields* being specified as occurring in it. The cluster of telescopic stars h. 3407 = Δ. 272, is actually contained within its area; and even in the middle of its extent gauges of 29, and 48 stars are noted. Its striking blackness is, therefore, by no means owing to an absolute want of telescopic stars, but rather to its contrast with the very rich portion of the Milky Way adjacent, where the gauges run up to 98, 100, 120, and even 200 on the preceding side,—to 65, 103, 108, on the following; 68 on the south, and 90 on the north. The contrast is enhanced by the suddenness of the transition. The gauge 65, occurs immediately on the following edge of the Coal-sack. In sweep 778, the northern border was definitely observed in R A 12^{h} 46^{m}, N P D 150° 13′, with the remark,—"The transition from rich Milky Way to

almost complete darkness is here very sudden;" while, on the preceding edge, the gauge 9 occurs almost immediately on entering within its precincts.

(321) It is about this region, or, perhaps, somewhat earlier, in the interval between η Argûs and α Crucis, that the Galactic Circle, or medial line of the Milky Way may be considered as crossed by that of the zone of large stars which is marked out by the brilliant constellation of *Orion*, the bright stars of *Canis Major*, and almost all the more conspicuous stars of *Argo*—the Cross—the Centaur, *Lupus*, and *Scorpio*. A great circle passing through ϵ *Orionis* and α *Crucis* will mark out the axis of the zone in question, whose inclination to the galactic circle is therefore about 20°, and whose appearance would lead us to suspect that our nearest neighbours in the sidereal system (if really such), form part of a subordinate sheet or stratum deviating to that extent from parallelism to the general mass which, seen projected on the heavens, forms the Milky Way.

(322) From the Coal-sack, over β, and almost up to α Centauri, the Milky Way continues broad, unbroken, and uniform, but just before arriving at α, it divides into two great and conspicuous streams (See Pl. XIII. fig. 2.), the preceding of which passes over B A C 4977 (miscalled by Bode ι *Lupi*), and π (Bode) *Normæ* = B A C 5136, its axis passing centrally between these two stars; thence to *d Lupi* (Bode) = B A C 5123, which its preceding border just attains, and from which point its intensity, hitherto very great, rapidly degrades. Holding on its course, it passes centrally over η *Lupi*, and finally loses itself in a faint effusion, which skirts the following side of the line of stars ρ, π, δ, β Scorpii. This branch is indicated in Bode's chart as terminating before it reaches η *Lupi*, near a star there marked *k*.

(323) The following, or main stream, setting out from α *Centauri* (having α *Circini* in the middle of its breadth, and extending nearly to γ *Trianguli*), proceeds northwards in a very vivid stream till it almost attains γ *Normæ*, including within its breadth in the earlier part of this its course, a rather remarkable lacuna of an elongated form, parallel to its general direction, about 5° in length and $1\frac{1}{2}$° in breadth, commencing near α *Circini*. Before attaining γ *Normæ*, this branch is connected with the preceding one described in the last article by a narrow and pretty conspicuous bridge, which covers the stars marked in Bode's map as ⁊, σ, and π *Normæ* (B A C 5283, 5209, 5136), and which insulates a long and somewhat triangularly formed dark space between the streams, having α *Centauri* at its southern extremity, and just included within it.

(324) At γ *Normæ*, the main branch of the Milky Way suddenly makes an abrupt bend at an angle of about 120° to the following side, passing over two stars dignified in Bode by the Greek letters ρ 1 and ρ 2 *Aræ*, but which are invisible to the naked eye—over ι *Aræ*, θ and ι *Scorpii*, and γ *Tubi* to an exceedingly bright and conspicuous round mass $1\frac{1}{4}$° in diameter, which is (or rather contains) the great cluster h. 3706, and thence to γ *Sagittarii*, about which it forms one of the most intense and striking developments in the form of an oval luminous mass about 6° in length and 4° in breadth, and in which, intermixed with gauges of 200 stars in the field, occur portions of such richness that it was found impossible to count the gauges, and *that* in a zone 3° in breadth, over an interval of R A from $17^h\ 45^m$ to $18^h\ 30^m$ (sweep 723). A very moderate calculation indeed, would make the number of stars in this mass upwards of 100,000.

(322) From this mass northward, across the ecliptic, in the bow of *Sagittarius*, and as far as *Antinous*, the broken and irregular aspect of the Milky Way is familiar to every European observer, though much better seen in southern latitudes. On its following side it graduates

away insensibly; but along its preceding border it is occasionally very definitely terminated, and especially it is broken by three deep sinuses, separated from each other by conspicuous protuberances, the one about the star *s Scuti* (B A C 6279), and the other a most remarkable, regularly formed, and considerably well defined paraboloidal mass, projecting boldly between *n* and *l* Scuti (Fl. 3 and 6 Aquil.), and of an intensity and richness hardly inferior to that adjoining γ *Sagittarii*. From *l Scuti* a deep hollow extends to λ *Aquilæ*, after which this branch (which must certainly be considered the main stream of the Milky Way, as *its* continuity alone is unbroken), runs northward through *Aquila*, without any further distinguishing feature to the junction of the two great streams in *Cygnus*.

(325) Bode's, and most other celestial charts, make the Milky Way bifurcate, in *Cygnus* and the tail of *Scorpio*, into two great streams, both of which, the preceding and the following, preserve their continuity, from point to point, unbroken. This, however, is the case only with the following, or main stream, whose course we have just traced. The preceding is discontinuous. Its northern portion (from *Cygnus* southwards) terminates precisely at the equator, just beyond the bisection of a line joining η *Serpentis* and β *Ophiuchi*, and from this to the nearest point of its southern continuation (if it can be so considered), there is a break of 14° in extent to the star *o* Serpentis, totally devoid of all appearance of it. In order to trace this southern portion, let us return to our point of divergence (Art. 321) at γ *Normæ*. Here, as we have stated, the following, or main stream, makes an abrupt elbow, and from this point (but on the other side of γ *Normæ*, and completely cut off it by a narrow and strongly marked dark channel, in whose middle that star is situated), this preceding stream sets off, running through ζ and μ to ϵ *Scorpii*, in a very irregular and patchy course. Northwards from ϵ, it expands into a vast effusion, filling nearly the whole area enclosed by ϵ, 1, *Scorpii*, η *Ophiuchi*, *o Serpentis*, E, D, π (Bode) *Ophiuchi*, and *u Scorpii*. Beyond *o* Serpentis (as above stated), it cannot be traced northwards. It rather sweeps round to the following side, as if to re-unite itself with the main stream, from which it can, in fact, hardly be said to be separated by a dark interval, in which are three lucid patches or islands, situated in a line drawn from μ *Sagittarii* towards η *Serpentis*, the southern and brighter being near μ, the northern and fainter opposite to *s Scuti*. This tendency to a reunion with the main stream, indeed, is conspicuous in other parts of its course. Thus, at μ *Scorpii*, it sends out a strong offset which crosses the interval between the two streams like a bridge, and joins the following one at θ, ι, κ *Scorpii*. So, also, another similar bridge crosses the interval from *u Scorpii* to the conspicuous round mass near γ *Tubi*, mentioned in Art. 321, passing between, and slightly involving the star I (Bode) *Tubi* = B A C 5925, and the place of a star marked ξ in Bode's constellation *Tubus*, not visible to the naked eye.

(326) If we now consider the telescopic structure of the region spread over by, and enclosed between the effusions of the Milky Way in the body and tail of Scorpio, the hand and bow of Sagittarius, and the following leg of Ophiuchus, we shall find it, in the highest degree, interesting and complex. No region of the heavens, in fact, is fuller of objects, beautiful and remarkable in themselves, and rendered still more so by their mode of association, and by the peculiar features assumed by the Milky Way, which are without a parallel in any other part of its course.

(327) To begin with the preceding offset of all, which takes its origin at *α Centauri*. This offers nothing peculiar in its internal constitution, but is separated from the others by a very poor region, in which several blank fields occur between the 126th and 129th degree of P D, and

so numerous are these from the 111th to the 117th in the region adjacent to *Antares,* as to make it doubtful whether the faint apparent illumination between β and ρ *Scorpii* be not a mere effect of contrast with the intense darkness on which it borders, the more so as the gauges in that region, ranging only from 10 to 20 stars *per field,* indicate rather a poor than rich scattering of stars thereabouts.

(328) The preceding stream, diverging from γ *Normæ,* presents in the more southern part of its course, as far as ζ and ϵ *Scorpii,* a succession of rich clusters of the 7th and 8th classes. In the bridge connecting ϵ with θ *Scorpii,* occur a globular cluster, and one of the only two annular nebulæ in the southern hemisphere (h. 3680). But in the northern portion, from the 120th to the 108th degree of P D, this branch is thickly set with fine globular clusters, *all of which* occur within its starry area, *and none in the* dark region intervening between the streams. Immediately on the following edge of this stream, between the 113th and 114th parallel of P D, occurs the other annular nebula (h. 3686). The richest portion of this stream is between the 118th and and 119th parallel, when the gauge indicates 120 stars per field, from which point northwards they decrease to 42, 60, 40, 37, 48, &c., and finally again attain 60 and 66. Following ϵ *Scorpii,* in the interval between that star and λ, this branch first presents the phenomenon of nebulosity irresolvable in the 20-feet reflector. "Sweep 791, $16^h\ 48^m$. The northern part of the zone (P D 122° 52′) is Milky Way, but strangely mixed, of patches of stars, and starless space, and light in the field without stars enough to account for it," an appearance which ceases, however, when we *leave* this branch and enter on the region intervening between the streams where it is noticed in the same sweep, that at $17^h\ 13^m$ "the northern end of the zone, though pretty rich in *stars,* is yet quite free from brightness of ground. It is as black as a coal."

(329) The constitution of the following, or main stream, is much more intricate and various. Besides being thickly set with superb globular clusters, from γ *Tubi* to the 113th degree of P D, its course from the 126th to the 117th degree is broken up into a succession of nebulous and semi-nebulous or barely resolvable masses, of small extent, and singularly insulated from each other, and from the starry portions. The superb nebulæ 8 Messier and H. IV. 41, with its trifid companion, which occur on or near its anterior border, seem to be only intense exaggerations of these nebulous appearances and patches, of which a large catalogue might easily be made. In describing the nature of these appearances, and the general telescopic aspect of this region, it will be better to let the observations speak for themselves, as actually recorded.

(330) In sweeps 791, 792, after passing across the dark interval between the two streams of the milky way, comprised between the two connecting streaks or bridges mentioned in Art. 322, in the zone of Polar distance between 123° and 126°, the coming on of the great stream is thus described:—"$17^h\ 32^m$ 124° 16′ the northern, and 124° 55′ the southern, edge of a great *nebulous* projection of the Milky Way of great extent running horizontally. At the former Polar distance, the northern half of the field of view has stars on a black ground. After this the Milky Way becomes very nebulous, in great cirrous masses and streaks."——"$17^h\ 31^m \pm$. Hereabouts begins a series of great nebulous and semi-nebulous milky way patches over the whole breadth of the zone from 123° 31′ downwards to 126°." At $17^h\ 34^m\ 31.4^s$ occurs (as a highly characteristic specimen) the mass figured in Pl. V. Fig. 1, and described in the Catalogue of Nebulæ, where it will be found under its proper R A, and in due succession the analogous masses described in the Catalogue as h. 3704, 3708, 3709, which, it is remarked, occur "among alterna-

tions of vacuity and richness most surprising, and baffling all description." As the main body of the Milky Way comes on, the frequency and variety of these masses increases. At $17^h\ 50^m$, the following remarks occur in the sweeps specified. "Here the Milky Way is composed of separate, or slightly, or strongly, connected clouds of semi-nebulous light; and, as the telescope moves, the appearance is that of clouds passing in a *scud* as the sailors call it."——"I could fill a catalogue with the clusters of the 6th class which are here. The Milky Way is like sand, not strewed evenly as with a sieve, but as if flung down by handfuls (and both hands at once), leaving dark intervals, and all consisting of stars $14...16...20^m$, down to nebulosity, in a most astonishing manner."——Again, at $17^h\ 53^m$, "After an interval of comparative poverty, the same phenomenon, and even more remarkable. I cannot say it is *nebulous.* It is all *resolved,* but the stars are inconceivably numerous and minute. There must be millions on millions, and all most unequally massed together, yet they nowhere run to nuclei or *clusters much brighter in the middle.*" This extraordinary exhibition terminates about the eighteenth hour of R A (where the Milky Way resumes its usual appearance), with the planetary nebula h. 3734.

(331) In the zone next adjacent (120°...123°), the nebulous appearance of the anterior edge of the great stream comes on later, and is less broken into distinct masses. In some places it is even sharply defined, a specimen of which (at $17^h\ 43^m\ 40^s$) is figured in Pl. V. Fig. 2, and described in the Catalogue. (See the above R A, and the description of the objects immediately following it.) Towards the end of the seventeenth hour, the globular clusters begin to come on. They consist of stars of excessive minuteness, but yet not more so than the ground of the Milky Way on which not only they appear projected, but of which it is very probable that they really form a part. (See the descriptions of h. 3720, 3723, 3731, 3736, and of the Milky Way at $18^h\ 8^m\ 10^s$ P D. 121° 59′ 55″ under that R A in the Catalogue, as also the remark in Art. 105).

(332) In the zone from 117° to 120°, the commencement of the Milky Way in $17^h\ 40^m$ is by a crowd of stars beyond counting, but which speedily becomes mingled with nebulous masses, as at h. 3712, which is the commencement of a series of such masses. At $17^h\ 45^m\ 30^s$, 119° 2′, a field of view is thus described:—"Here is a field, the preceding half of which is clear of nebula, the last patch having disappeared, but the following is densely filled with NEBULOUS MILKY WAY!! ($\int$ 723.)" At $17^h\ 49^m$, 118° 7′, is noted the northern limit, and at $17^h\ 47^m\ 58^s$, 119° 22′ the southern, of a great nebulous or almost nebulous protuberance or promontory, "which projects into the field of view as the Cape of Good Hope on a map does into the Southern Ocean." ($\int$ 723, 478.) At $17^h\ 50^m$, 118° 59′, "the density of the *nebula* is extraordinary, and the *stars* are by no means sufficient to make glare enough to account for it." h. 3732 is evidently a nebuloid of the same nature, but more resolvable.

(333) Proceeding still northwards, in the zone 114°...117°, presently after quitting the preceding stream of the Milky Way, we fall upon a series of blank fields, and exceedingly poor spaces, extending in R A from $17^h\ 10^m$ to $17^h\ 25^m$, and from P D 115° 40′ to 116° 54′, forming a dark patch which corresponds in a remarkable way to that near *Antares* on the opposite side of the preceding stream, already noticed in Art. 324. The place of this void space corresponds to the following foot of *Ophiuchus* nearly on Bode's Chart, south following the star marked π in that chart, but which is called θ in B A C. Immediately after this, between the right ascensions $17^h\ 28^m$ and $17^h\ 35^m$, we come upon the returning portion of the broad effusion of the preceding branch of the Milky Way, where it makes a sweep round π (θ) *Ophiuchi*, and which is thus

characterized in ∫ 723 "17^h 25^m, 116° 52′, a field selected among many nebulous ones" (after a starless and perfectly dark space) "for having very few stars, and yet being so bright that I see all the wires." Again, in ∫ 724 "$17^h 28^m 16.7^s$, 114° 27′ 1″, the Milky Way comes on in large *milky nebulous* irregular patches and banks, with few stars of visible magnitude. After a succession of blank fields, and a region of extremely rare stars above 18^m, I do not remember ever seeing the Milky Way so decidedly nebulous (or indeed at all so) before."——"17^h 35^m 18^s, 114° 25′ 32″, the southern edge of the Milky Way, terminated by an irregular nebulous fringe as if lacerated. The body of it towards the north is very decidedly nebulous." Quitting here this curl of the preceding branch, and traversing the interval which separates it from the following or main stream we come in the first instance on Messier's eighth nebula (Pl. I. Fig. 1), which may probably be regarded as one of the nebulous outliers of that stream, since it is hardly passed, when at 18^h 2^m 55^s, 116° 49′, "the Milky Way comes on suddenly, the commencement being in streaky or riband-shaped masses of stars so small as to be almost nebulous, yet when well examined it is all resolved." At its immediate preceding border occurs the fine globular cluster h. 3730 (VI. 12), which partakes of the same character, as regards the excessive minuteness of its stars; and the same remark applies to two other similar clusters h. 3743 (M. 28), and h. 3748, which occur further on in R A.

(334) In the next zone (111° . . . 114°) at 17^h 37^m R A, P D 112° 56′, we find still the same phenomenon of irresolvable nebulosity thus described. "This is about the middle of a very large space in the Milky Way which is completely nebulous, like the diffused nebulosity of the Magellanic Cloud, with a tolerable abundance of very small stars also scattered in it." And again, "17^h 48^m, 111° 2′, the apparent top of the field (the real bottom) is full of faint nebulous light without stars: the rest of the zone is blank." At 18^h 8^m "the real Milky Way is just come on in great cloudy semi-nebulous masses running into one another, heaps on heaps." This again corresponds to a portion of the preceding effusion. Before we reach the following stream an interval has to be traversed in which (again as a premonitory outlier) occurs the great "trifid nebula" figured in Pl. II. Fig. 2.

(335) From the foregoing analysis of the telescopic aspect of the Milky Way in this interesting region, I think it can hardly be doubted that it consists of portions differing exceedingly in distance, but brought by the effect of projection into the same or nearly the same visual line: in particular, that at the anterior edge of what we have called the main stream, we see, foreshortened, a vast and illimitable area scattered over with discontinuous masses and aggregates of stars in the manner of the cumuli of a mackerel sky, rather than of a stratum of regular thickness and homogeneous formation: and that in the enclosed spaces insulated from the rest of the heavens by the preceding and following streams, and the "bridges" above spoken of as connecting them (as, for instance, in that which includes λ Scorpii), we are, in fact, looking out into space through vast chimney-form or tubular vacancies whose terminations are rendered nebulous by the effect of their exceeding distance, and at the same time are brought by that of perspective to constitute the interior borders of the apparent vacuities. It is possible that the globular clusters we see scattered over it are nothing more than such masses in a higher state of aggregation, to which perhaps the others are by slow degrees advancing. Yet in that case we should certainly be prepared to expect specimens of an intermediate character to occur in considerable numbers, scattered among them, whereas in fact it would be difficult to particularize any objects in the region

in question which can be quite fairly so considered. The intermediate stages of central condensation between the highly compressed globular cluster, and the dilute and nearly uniform nebuloid patch, if not altogether wanting, are, at all events, feebly represented.

SECTION III.—OF SOME INDICATIONS OF VERY REMOTE TELESCOPIC BRANCHES OF THE MILKY WAY, OR OF AN INDEPENDENT SIDEREAL SYSTEM, OR SYSTEMS, BEARING A RESEMBLANCE TO SUCH BRANCHES.

(336) I find frequent mention made in the course of sweeping, of a phenomenon which would appear to indicate the existence of starry regions of great extent and excessive remoteness, disconnected, or at least in no traceable connexion with any part of the Milky Way except in some particular localities, but which yet may possibly be branches or outlying portions of that system. This phenomenon consists in an exceedingly delicate and uniform dotting or stippling of the field of view by points of light too small to admit of any one being steadily and fixedly viewed, and too numerous for counting, were it possible so to view them. Of the reality of this phenomenon (which has occurred in parts of the heavens far remote from the Milky Way, or from any large nebula or cluster) I have always felt satisfied at the moment of observation. But that conviction has not been permanent. The idea of illusion has continually arisen (subsequently), partly owing to the extreme delicacy of the points of light so seen or suspected, but chiefly from the circumstance that when noticed (usually in taking the gauges) it has been *almost* invariably in the first quarter or half an hour from the commencement of sweeping; often in the first gauge taken, and in that only; occasionally later in the sweep, but after an interval of rest. To this, however, there is here and there an exception. Pointed mention is, moreover, not unfrequently made of the *perfect darkness of the ground of the sky* in some regions; which would appear to indicate that light had prevailed, without stars being *seen*, in the parts viewed previously. I think it right, therefore, not to suppress all mention of the phenomenon in question, which, if it arise from physiological causes is at least curious and remarkable as a case of optical illusion.

(337) The following is a list of the places in the heavens where this phenomenon has been remarked, with the sweeps in which they have been noted. Col. 1 contains a reference number; col. 2, the R A of the place observed; col. 3, the polar distance of the zone affected or the middle of the field of view gauged; col. 4, the sweep. An asterisk (*) affixed to this number denotes that the phenomena was noted only in the first half-hour of sweeping, or within the same limit of time after an interruption of the sweep by an interval of rest and absence from the telescope. The letter M similarly attached indicates that the place set down is in the neighbourhood of the Milky Way.

No.	R. A. h. m.	N P D. ° ′	Sweep.		No.	R. A. h. m.	N P D. ° ′	Sweep.	
1	3 47	99°....101°	758	*	6	4 29	124 28	663	
2	3 50	124 28	663		7	4 30	148 28	665	*
3	4 11	156°..159°	653	*	8	5 24	123°..126°	535	*
4	4 16	156 10	653	*	9	5 39	124 28	535	*
5	4 19	125 58	663		10	5 45	112 27	532	*

No.	R. A. h. m.	N P D. ° ′	Sweep.		No.	R. A. h. m.	N P D. ° ′	Sweep.	
11	6 49	151 27	682	*	25	19 49	160 28	604	*
12	7 14	139 29	526	*	26	19 59	119 56	620	
13	7 19	152 57	682	*	27	20 9	121 26	620	
14	8 0	148 24	543	* M	28	20 59	121 56	620	
15	8 53	109 24	561	*	29	21 0	152 57	613	*
16	10 50	142 35	576	*	30	21 1	165°....168°	627	* ?
17	13 48	163 28	606	* M	31	21 9	120 26	620	
18	14 50	144°....146°	694	M	32	21 11	166 26	627	* ?
19	15 0	150 7	575	M	33	21 21	164 56	627	
20	15 20	134 53	695	M	34	21 24	118 56	620	
21	15 39	168 2	592	* M	35	22 49	127 33	636	*
22	15 40	147°....150°	575	M	36	23 30	145 24	629	*
23	15 40	125 52	791	M	37	23 44	150....153	736	*
24	16 41	122 52	791	M					

(338) In ʃ 663 (Nos. 2, 5, 6), the appearance in question continued during forty minutes, after which it ceased to attract attention. In ʃ 526 (No. 12), it occurred after twenty minutes' sweeping, preceded by an interval of forty minutes' rest. The observation No. 18, is thus recorded: "A very remarkable change in the ground of the sky. From being light and dotty, it is now become, all over the zone, clear black, on which the stars stand as on a black ground: Nos. 19, 22, are almost upon the Milky Way, and indicate a transition to its nebulous state. In the latter entry especially it is stated, that "over the whole zone, the Milky Way is very remarkable, consisting of large and small stars loosely scattered over a brilliant and closely stippled reticulated ground of stars, say 17 m. With attention they are *insulable* and innumerable." The "*stippling of the ground of the sky*" to which attention is intended to be drawn in these notices, seems to be one step farther in the progress towards milky nebulosity than this observation records. In the observation No. 20, twenty-eight stars 12 and 13 m were counted "on a field uniformly stippled over. A remarkable field." This occurred after two hours fifty minutes of continuous sweeping, in the course of which, at $13^h\ 0^m$, the ground of the sky is expressly stated to have been quite black. In ʃ 620, which is far enough from the borders of the Milky Way to be fairly out of its *ordinary* influence, the notices of the stippling are very strongly expressed, thus:—"$19^h\ 59^m$, field distinctly stippled all over uniformly;" "$20^h\ 9^m$, I feel satisfied the stippling is no illusion, as its dark mottling moves with the stars as I move the tube to and fro;" "$20^h\ 29^m$, stippling no longer seen; $20^h\ 39^m$, the stippled appearance is gone; $20^h\ 59^m$, query, if not a feeble stippling;" and so on to $22^h\ 29^m$, where the ground was observed perfectly dark, and this remark added, "Hitherto there has been light in the field, especially when faint or doubtful stippling has been recorded." In ʃ 627 the *entries* of stippling are only in the first three gauges (Nos. 30, 32, 34), but it is not till R A $22^h\ 1^m$, or after a full hour from the commencement that it is *declared to be* "*gone*." In ʃ 629 (No. 36) the phenomenon is noted as "feeble." On this occasion the entry occurs after nearly an hour's sweeping; but this had been interrupted from $23^h\ 5^m$ to $23^h\ 18^m$, during which the eye of a friend replaced my own at the telescope while I stood by, without, however, quitting the platform, or going into the light. This was twelve

minutes before the entry in question, and a gauge taken at $23^h\ 20^m$, only two minutes after resuming the observations, mentions no stippling.

(339) In order to throw as much light upon this subject as possible, I have projected all these recorded points on a chart, with a view to see whether they group themselves in any consistent manner. One group occurs tolerably compact, occupying the arms and fore-legs of the Centaur, and this seems pretty evidently connected with the Milky Way, which runs directly across it. Another more loosely occupies the constellations *Lepus*, *Columba*, and *Pictor*, while a third straggles over a region including *Pavo*, *Grus*, and the hind part of *Sagittarius*. These include all the recorded fields but three, which are outlying and disconnected.

(340) The following is a list of points recorded as having the ground of the sky particularly black, and certainly devoid of any such stippling or nebulous phenomenon.

R. A. h. m.	N P D. ° ′	Sw.	R. A. h. m.	N P D. ° ′	Sw.	R. A. h. m.	N P D. ° ′	Sw.
0 39	123 1	635	9 9	173 0	779	17 3	117 35	723
2 0	134 49	634	9 28	120 29	678	17 13	123 —	791
2 30	136 19	634	13 0	137 53	695	17 18	116 45	723
4 10	129 32	638	14 50	145 29	694	19 11	160 28	604
7 3	104 59	757	16 10	123 126	791	21 23	157 30	610
7 36	113 57	677						

(341) I shall close this chapter by a general reference to Plate XIII. Figs. 1, 2, which represent the cause and aspect of the Milky Way, from *Antinous* to *Monoceros*, delineated with as much precision as the nature of such work admits, i. e. with the naked eye by faint lamplight, in the open air. In the projection, the Galactic Circle or medial line of the entire galaxy is extended into a straight line which is divided into hours of right ascension at the points where the meridians of those hours cross it. The figures are reduced from drawings on a larger scale, viz. that formed by pricking off the stars from Bode's charts, on blank paper, to serve as skeleton charts for that purpose as well as for a general triangulation of the whole heavens (northern as well as southern) in which it was proposed to lay down every star visible to the naked eye.* From these charts the Milky Way has been transferred by laying down (from a good celestial globe, by Bardin, for 1800) the chief stars, as a skeleton—inserting others from the maps by the aid of proportional compasses, and then working over it an accurate resemblance of the forms, and as near as possible of the intensities, of the several parts in the originals. The reader may perhaps be surprised by differences which occur in very obvious features between this and former representations, as, for instance, in the great embranchment at α Centauri, which both in Bode's chart and in Mr. Dunlop's figure is made to take place at or near β, and in several other points which it is not worth while to particularize.

* This operation, I may as well mention, has been very nearly completed in the Southern Hemisphere (a few triangles only having escaped), and quite so in the Northern; just as the elaborate charts of Argelander and Schwink, aiming at and accomplishing the same objects for that part of the heavens visible in Europe, have satisfied, at least to that extent, the present wants of astronomers.

CHAPTER V.

OBSERVATIONS OF HALLEY'S COMET, WITH REMARKS ON ITS PHYSICAL CONDITION, AND THAT OF COMETS IN GENERAL.

(342) It was not before the 28th of October (1835) that I obtained a view of this long expected and anxiously looked for member of our system. On the 21st and following days of March, guided by Mr. Rümker's ephemeris, which fortunately came to hand in time, I had examined both with the equatorial and with the 20-feet reflector the places set down in that ephemeris for the days of observation, and the whole adjacent region of the heavens, with all possible attention, but without success. Nor was I more fortunate in the end of August and the beginning of September, when, on several occasions, in the morning before sunrise, I swept over the places given in the Nautical Almanac for 1835, which it is now known were not far from the true ones. On these occasions, however, my search was uniformly baffled by a drift of light, low, scudding vapour, hurried rapidly along by the south-east wind of the season, and forming constantly anew nearly on the spot to which the telescope was directed. The local situation of the observatory exempts it from this annoyance (which is a consequence of the greater proximity of Feldhausen to the slope of the Table Mountain, the great rendezvous of the south-east cloud-drift); and, in consequence, I am informed by Mr. Maclear that, on the morning of the 1st September, he succeeded in obtaining a satisfactory observation.

(343) On the 24th October the comet was seen by several persons in Cape Town with the naked eye; but even so early as the 22nd, my own servants had obtained a sight of it for a few minutes (but without informing me at the time) during a casual and transient removal of the vast pile of clouds which then, and for many evenings subsequent, congregated over the summits of the Table and Devil Mountains. This obstruction continued till the 28th, in the afternoon of which day, despairing of success at home, and impatient of repeated disappointments, I dismounted the equatorial telescope, and having constructed for it a convenient temporary stand transported it to a station on the Cape Flats, five or six miles to the eastward of Feldhausen, where a clear sky might be depended on. There, sheltered by a range of low sand-hills from the violence of the south-east wind, and freed by distance from the obstruction produced by the Table Mountain with its superposed mass of cloud (which at that time extended over the zenith of Feldhausen), the instrument was erected about sunset, and before the termination of the twilight I had the gratification to obtain an excellent view of the comet.

(344) Its appearance on that evening, to the naked eye, was about that of a star of the 3rd magnitude, which, as the darkness increased, appeared somewhat hazy, and accompanied by a

scarcely perceptible tail. In a night-glass, however, the tail was conspicuous enough and 3° in length, extending to, and just perceptibly involving, a star of the 6th magnitude, afterwards identified by reference to Bode's Atlas as No. 217 of his Catalogue, = λ. 31816, the comet itself holding the situation and presenting the appearance represented in Fig. 1, Pl. XIV., in which figure the star a is that marked in Bode's Chart as n Ophiuchi (B A C. 5890), b = I (Bode Ophiuchi),* c = λ. 31592, d = λ. 31485, and f = λ. 31699.

(345) Fig. 2, Pl. XIV., represents its appearance on the same evening in the 7-feet achromatic, with its ring micrometer eye-piece magnifying about seventy times. It was that of a nebula very suddenly and highly condensed in the centre, to so great a degree indeed that I would not (from this observation alone) have ventured to deny the existence of a solid nucleus. No phase, however, was perceptible on that central mass which might have been so regarded. Neither was any other remarkable peculiarity about the head, nucleus, or tail, noticed on this occasion.

(346) The following evening (the 29th) proved very clear at Feldhausen, and having cut down several trees which obstructed the view of that part of the sky where the comet would set (and which had already been partially cleared for the comet of Encke), the 20-feet reflector, armed with an excellent mirror, recently and brilliantly polished for this express service, was directed on it as soon as it became visible in the finder in the strong twilight. Under these circumstances its appearance was most singular, and such as I had never observed and do not remember to have seen described in any previous comet. Its nucleus, small, bright, and highly condensed, was shielded or capped on the side next the sun by a vivid but narrow crescent of nebulous light, Fig. 3, Pl. XIV., the front of which presented an outline nearly circular, having an amplitude of somewhat more than 90° from horn to horn. Within this was situated the nucleus, but at a distance behind the front or vertex of the crescent, considerably less than its venedsine, so that the horns of the crescent extended a good way behind the nucleus on either side. On the other hand, the nucleus lay somewhat behind the interior boundary (if it could properly be said to have a boundary, shading off insensibly though rapidly) of the crescent; and, not being itself a well defined planetary body, but apparently only a spherical nebula in a state of high central condensation. The exterior portions of its nebulosity appeared to blend with the interior border of the crescent, in such a manner as to give the impression of a compounded outline, consisting of two slight concavities meeting in a sort of blunted cusp at the nucleus. This is no doubt Mr. Cooper's fan, and M. Arago's sector, or at least their denser portion—such as the twilight could not obliterate—or at all events a modification of those phenomena induced by lapse of time. There can consequently be little doubt of its existence on the preceding evening, so that its escaping notice in the former observation can only be ascribed to want of sufficient light in the instrument employed—a defect which no degree of distinctness under magnifying power can compensate in the examination of nebulous phenomena.

(347) In the state above described, and shorn of its exterior envelopes, the distance of the central point of the nucleus from the vertex of the crescent was estimated at 45″, and the breadth of the latter from horn to horn at 2′ 30″ or 3′ at most. The nucleus was decidedly not planetary,

* This star does not occur either in B A C or in λ. It is, however, visible to the naked eye as a star 5½m., and, as such, was observed by me on June 2, 1842, in Chart Triangle No. 620.

and as decidedly exhibited no phase. As the evening advanced, the exterior strata of the crescent—the coma and the tail which were before obliterated by the twilight—became visible, and the whole finally put on the appearance represented in Fig. 4, Pl. XIV. The tail, however, was never very apparent, and the magnifying power (180), the lowest I could then apply, was still too high to give its feeble light sufficient concentration to enable me to trace its course, and say with confidence whether the chord of the crescent was or was not perpendicular to the general direction of the tail. Certainly at the time I had no suspicion of its being otherwise.

(348) The next day (the 30th) I visited the Observatory, and as the clouds towards evening covered the whole Table Mountain in such a manner as to preclude any hope of an observation at Feldhausen, I remained, and was indulged by Mr. Maclear with a view of it through the 14-feet Newtonian reflector of my father's construction—an instrument of great optical capacity, both as regards light and distinctness. In this, the appearance was very different from what was observed on the previous night. I could discern no distinct crescent, but in its place a strongly marked arc in the bend of the tail round the head, which was decidedly most luminous at the north preceding side of the vertex.

(349) On the 31st, the general appearance of the comet was not materially different. The diameter of the head or more concentrated part around the nucleus, distinguished sufficiently by its spherical form to admit of measurement, was found to be 80 parts of the equatorial micrometer, corresponding to $19''.2$. On this occasion, also, the comet was compared micrometrically with a star of the 7th magnitude just outside of the following border of its tail as under, viz., S T $22^h\ 25^m\ 40''$ north of star 479 Micr Pts $= 1'\ 55''.2$ and S T $22^h\ 28^m\ 40^s$ $\sigma =$ preceded star $46^s.5$ in time. Previous to the perihelian passage, however, I did not think it necessary to pay regard to exact determinations of its place, which would have demanded the exclusive use of the equatorial, and involved the loss of opportunities for examining its physical construction with the 20-feet.

(350) On the evening of the 31st, the crescent was less remarkable than on the 29th, and on the following evening (Nov. 1st), still less so; its appearance on that evening was as represented in Fig. 5, Pl. XIV. in which the only feature deserving especial notice consists in the extension of the feeble light of the coma, considerably beyond the general parabolic sweep of the denser portion of the tail around the head.

(351) By this time the observation of the comet with the 20-feet was growing difficult, and confined to a brief interval before its disappearance behind local obstacles. I therefore regretted the less the necessity of leaving home for some days on the 2nd November. On my return on the 10th, it was still visible by climbing above the nearer trees, in the strong twilight, as a star of the 2.3 or 3rd magnitude, though out of the reach of any instrument but a night-glass held in the hand, through which its tail was seen, at the instant of disappearance of the head behind the Table Mountain, extending over just one radius of the field, or about $2\frac{1}{2}°$.

(352) On the return of the comet from the sun, it was carefully swept for before sunrise, on several occasions, about the end of December, especially on the 21st and 26th, which days I particularize on account of the perfect clearness of the horizon down to the summits of the Hottentot Holland Mountains, a range of hills to the south-east, about 3,000 or 4,000 feet in height, and distant 25 to 30 miles. On these occasions, Antares was taken as a point of departure, and azimuthal sweeps made on either side, from the horizon upwards, but without perceiving it. By

Mr. Stratford's elaborate ephemeris (which of course had not then come to hand), it now appears that the comet in all this interval must have occupied a situation so near Antares, that its escaping observation at that time, although in strong twilight, seems not a little remarkable, though in great measure explained by the course of the subsequent phenomena. Cloudy mornings, and other occupations, then intervened; indeed, I had begun to despair of its re-appearance. On the 25th of January, however, notice was received from Mr. Maclear of his having rediscovered it on the morning of that day, or, more properly speaking, the night of the 24th, astronomical reckoning. This intelligence set everything once more on the alert; and so soon as Scorpio became visible on the subsequent night (or morning of the 26th), it was conspicuously seen somewhat above the star ρ of that constellation, as a bright star of the 4th, or small one of the 3rd magnitude. Trees not yet allowing it to be taken up in the 20-feet, the equatorial was turned upon it in the first instance until it had attained altitude enough to be visible in the former instrument; and this was the course of proceeding on subsequent mornings, until the advance of the season, and the progress of the comet in its orbit, rendered it equally convenient for either instrument at an earlier hour.

(353) To the naked eye it now offered the aspect of a star, a very little dim and hazy; but no tail was visible, neither was any seen in the night-glass, in which its appearance was that of a highly condensed globular nebula. In the equatorial it appeared as a bright, round, and very nearly uniform nebulous disc, little condensed towards the centre, but decidedly more sharply defined on the following than on the preceding side. Scarcely any nucleus was to be seen, except that by glimpses some small, ill-distinguished object was perceived near the centre. No trace of a tail was observed with this instrument, but a considerable coma enveloped the disc above mentioned, extending to nearly the same distance on all sides, and giving to the whole object a strong resemblance, though on a greatly enlarged scale, to those singular nebulæ which are described as at first very gradually, then very suddenly, much brighter towards the middle, up to a uniform disc of sensible diameter.

(354) Viewed through the 20-feet reflector (which on this as on the former occasion I had taken care to provide with a mirror freshly polished and in the highest possible condition, which had been kept in readiness for its return from the sun) the comet now was indeed a most singular and remarkable object, Pl. XV. Fig. 1. Certainly nothing could be more surprising than the total change which had taken place in its appearance since the observations of October. Not to speak of the extraordinary sharpness of termination of the head, especially towards the following side, for which I can find no comparison so apt as the ground-glass shade of an Argand lamp; a new and perfectly unexpected phenomenon had developed itself, a phenomenon, I believe, quite unique in the history of comets. Within the well-defined head, and somewhat excentrically placed (being rather nearer to its southern than to its northern edge), was seen a vividly luminous nucleus, or rather an object which I know no better way to describe than by calling it a miniature comet having a nucleus, head and tail of its own, perfectly distinct and considerably exceeding in intensity of light, the nebulous disc or envelope which I have above called the "head." As the comet gained altitude, a minute bright point like a very small star, or rather like the nucleus of the nebula in Andromeda, only smaller, came to be distinctly perceived. It is this point which I shall henceforward term the nucleus, and which, according to the state of the atmosphere at the time of observation (and perhaps also that of the comet itself) was subsequently

seen sometimes more, sometimes less sharply concentrated, and stellar—but always of excessively minute dimension, certainly on no occasion subtending an angle of 4″, and never quite so well defined as give a positive assurance of the existence of a solid sphere—much less could any phase be at any time discerned on it. The whole was encircled with a strong *coma* which nearly filled the field of view (15′ diameter), dying away insensibly but rapidly at the edges. When the nucleus was brought to any part of the circumference of the field, the border of the coma fell little short of the centre. On the south preceding side, however, its extent was somewhat greater, projecting in that quarter into a feeble and irregular appendage, which might be regarded as a rudimentary tail.

(355) From the 25th January, whenever the weather would permit, till the final disappearance of the comet, it was observed constantly with the equatorial, and, as often as the other indispensable duties of the 20-feet would permit, with that instrument. My last observation of it dates on the 5th of May, on which day it was still visible, though with great difficulty, in the equatorial; so conspicuous was it on the 4th, in the 20-feet, that I fully expected to have kept it in view at least another fortnight. In this, however, I was disappointed. Cloudy nights prevented further operations till the 11th. Late on that night the clouds dispersed, and sweeping for it out of the meridian over its presumed place three nebulæ were encountered, one of which (I. 163) was at once recognised by its form, and as being far too bright; a second, not occurring in the catalogues, was considered too faint, as well as too far from the expected place, to be the comet; a third was then found, and although from the first it was suspected not to be the comet, not having sufficient central condensation, yet as the place seemed to agree tolerably, and no other object offering the same degree of probability had presented itself, I identified it by means of surrounding stars, and then had recourse to the equatorial to determine its place, when it proved to be the nebula II. 305. The opportunity of further examination was, however, lost for that night.

(356) On the 12th of May a sweep was set, including the 96th, 97th, and 98th degrees of N P D, within which it was certain the comet must lie, and to pass over the two stars marked in Bode's Atlas as *g Sextantis* (Fl. 17 and 18), the nearest lettered stars to its expected place as laid down in the chart by the last obtained daily motion in R A and N P D. As the time of transit approached the sweep was interrupted by clouds, between which, however, the nebula I. 163 was seen, and its place taken, R A $9^h\ 56^m\ 44^s.1$, N P D $96°\ 54'\ 13''$ (1830). From that time till $11^h\ 5^m$ it continued cloudy, admitting only momentary glimpses, during which whole interval, nevertheless, the sweeping was continued, that no chance might be missed. The moment it cleared, the transit being long past, the telescope was directed out of the meridian on *g Sextantis* as a point of departure to sweep from. It was now perfectly clear, and to my surprise, but at the time to my great satisfaction, in the field with g^1 the brighter, and preceding of the two stars of *g*, an object was seen which at once impressed me with a full conviction of its being that I was in search of, no catalogued nebula occurring in that place. In my sweeping journal it stands described as "A faint nebula of the 2nd class, but very suddenly brighter in the middle to a stellar point, equal to a star 16 m. Diameter about 1′ or $1\frac{1}{4}'$. The star prevents it being seen of its full size and brightness, but the observations are unexceptionable. I showed it to my attendant, who saw it as described." This nebula (for such it proved to be)

preceded the star g^1 by $0^s.87$; and its difference of declination, as determined by an oblique transit across a wire 45° inclined to the parallel, was found to be 4′ 36″ south of the star.

(357) The next night the telescope was again turned on *g Sextantis* as a starting point, whence, by the easy transition of a day's motion, the comet might be readily taken up, the state of the weather precluding a regular sweep, though admitting excellent views in brief intervals. To my mortification, however, on the first view of g^1 it was seen accompanied by the same nebula, in the same precise situation as the previous night.* Clouds prevented all further search on that and several subsequent nights; and when at length the weather became favourable no trace of the comet could be found, after most patient and persevering search. Thus, by a most inopportune discovery of a nebula, otherwise interesting enough, I found myself deprived of the opportunity I should doubtless have otherwise enjoyed, of accompanying this remote denizen of our system a few steps farther on his journey.

(358) On account of the interest which may be considered to attach to the final disappearance of this comet, it has been thought right to state the above circumstances. I proceed now to detail the observations made in the interim, and endeavour to present a connected view of the various remarkable changes the comet underwent in its figure, dimensions, and in the relative degrees of illumination of its constituent parts, viz., the coma, the tail, the head, and the nucleus, with its ray or tail. As respects the micrometric comparison of its places with those of neighbouring stars, from January 25 to May 5, both inclusive, I have already published them in the "Transactions of the Astronomical Society," vol. x. p. 325, et seq., which volume also contains the far more elaborate observations of Mr. Maclear, extending over the whole of that interval of time, and given with all possible circumstantial detail. These, therefore, I pretermit as unnecessary; reserving, however, a few remarks at the end of this chapter in explanation of some artifices employed in the management of the equatorial to insure exactness when the comet grew very faint, which may be useful to others under similar circumstances.

(359) The appearance of the comet on the 25th January has been already described, and is represented in Fig. 1, Pl. XV. Before turning the 20-feet upon it, the following measures were procured with the equatorial :—

M T $13^h\ 38^m$	—Diameter of the head in Right Ascension	229″.4
	Distance of the nucleus from the vertex (uncertain)	118″.3 : :
$14^h\ 15^m$	—Diameter of the head in Declination	237″.3

Returning to this instrument after the 20-feet observations were terminated, I repeated these measures, and was not a little surprised to find the results most materially different, viz. :—

M T $16^h\ 25^m$	—Diameter of the head in Right Ascension	196″.7
$16^h\ 29^m$	—Diameter of the head in Declination	252″.0

These measures having been performed in strong morning twilight, the deficiency in the measure in R A was easily accounted for by the action of the twilight on the ill-defined and graduating posterior† portion of the head. But how to account for the increased result of the measurement

* I find a loose memorandum, dated February 2 (which must have been 1837), to the following effect—"Viewed *g* Sextantis. The nebula stands as before, viz., exactly south of g^1 and about 4′ distant."

† Posterior, in reference to the *vertex*, which, as fronting the sun, is considered as the anterior portion of the comet, without regard either to its diurnal or orbitual motion.

across the axis, where the edges of the portion measured were both well defined? A difference of 14″.7 between the measurements of the same dimension taken within two hours and a quarter of each other, and in opposition to the tendency of the twilight, seemed inconceivable, and threw a momentary doubt on the exactness of the earlier measure. That measure had, however, been taken and read off with all possible care, and in short, nothing remained but the conclusion *that the change was real, and that the comet was actually increasing in dimensions with such rapidity that it might almost be said to be seen to grow!*

(360) Here was a phenomenon of a new and startling kind. The increase in the dimensions of comets in their recess from the sun, had, it is true, been pointed out and dwelt upon by M. Valz, as an effect due in his opinion to the relief of pressure of the æther upon them, and as following a certain direct ratio of distance from the sun, such as might be conceived to correspond to the supposed density of the æther at that distance. But in this case, in so small an interval of time, the change of distance from the sun is altogether trifling compared with the change of dimension. If the above measures were correct, the bulk of the head (supposing its posterior part to have participated in the increase) must have enlarged in the ratio of 1 : 1.198 or 5 : 6, a quantity out of all proportion to the increase of its radius vector in the interval. Subsequent observations, it will be seen, show the change not to have been indeed quite so rapid, while they confirm its reality, and lead to conclusions of the most singular nature, as will be shown when we come to consider a *resumé* of the results.

(361) On this night the position of the axis of the nuclear ray, taken with the 20-feet micrometer, was 276°.9, and its length, from the nucleus to a small star, which, at $15^h\ 40^m$ M T, happened to be situate precisely in the axis, and at the extremity, came out, by a difference of R A, = 91″.75, which, however, is probably rather too small. The nucleus itself was somewhat excentrically placed, with respect to the line of symmetry of the head being nearer to its southern than to its northern limb. Its distance from the vertex at $15^h\ 23^m = 7^s.00\ \Delta$ R A = 95″.0.

(362) On the next night, the 26th, the increase of dimension of the comet was evident at the first glance. Its form, too, had undergone a change, being more elongated in proportion in the direction of its axis, and materially less definite in its posterior region. Its appearance in the 20-feet and proportional size (being drawn on the same scale as Fig. 1), are represented in Fig. 2, Pl. XV. The coma also had undergone a great and remarkable change—not so much in dimension (which had not indeed increased proportionally, extending still to a distance from the vertex only 0.8 of a radius of the field or 6′) as in brightness; being very much enfeebled. The small protuberance, however, to which allusion has already been made, on the south preceding side, had extended into a sort of wing towards a star of the 9th magnitude *s p*, to a distance nearly twice as great as in any other quarter. The head or envelope had begun to assume an evident tendency to a paraboloidal form, the posterior portion being terminated, however, by an outline of an oval or nearly semicircular figure. The nucleus appeared as a star about the 11th magnitude, not, however, sharp and sparkling like a true star, but furred and nebulous, so that, with its ray, it presented exactly the appearance of a miniature comet, having a head and tail of its own.

(363) The dimensions of the comet obtained on this night, with the equatorial, were as follows:—

M T $14^h\ 21^m$—Length of the Paraboloid from vertex, or Diameter of the head in R A	.	311″.4
$14^h\ 25^m$—Diameter in Declination	. . . .	328″.9
$14^h\ 27^m$—Diameter across the axis, or greatest breadth of the well-defined portion	.	333″.5
$14^h\ 31^m$—Distance of Nucleus from vertex	. . . .	110″.9

Differences of R A, and measures with the 20-feet position micrometer, gave for

M T $15^h\ 40^m$—Diameter in R A ($23^s.625 = \Delta$ R A)	. . . .	308″.9
$16^h\ 2^m$—Distance of Nucleus from vertex in parallel ($9^s.28$)	. . . . . .	121″.3
$15^h\ 51^m$—Length of Ray in R A ($12^s.19$)	. . . .	159″.5
$15^h\ 24^m$—Position of Ray, 276°.3.		

The total bulk of the comet (exclusive of the coma) had therefore considerably more than doubled within the twenty-four or twenty-five hours elapsed since the measurements of the previous night!

(364) On the 27th January, the appearance in the 20-feet was as represented (on the same scale) in Fig. 3, Pl. XV. The head or envelope with its enclosed nucleus and ray, still more dilated than last night, but the coma was grown extremely thin and faint, still, however, extending to about the same distance from the well defined outline of the vertex. It had lost, however, all regularity of form. A considerable ragged protuberance appeared in front, in the *n f* region, while the *wing* on the *s p* side seemed to have attached itself to the arc of the paraboloid, prolonging it as a kind of one-sided and false tail. During the whole of this night's observations, the southern arc of the paraboloid appeared larger than the northern. The nucleus presented less of a stellar aspect than heretofore, and more that of the head of an ordinary comet, its denser portion being estimated at 12″ in diameter. Measures of the several parts were taken on this, and on all other occasions, so long as it continued practicable to do so; but, not to interrupt the course of our statement with a mass of figures, they are reserved to be presented synoptically in tabular form.

(365) Jan. 28. 20 feet. "Most astonishing! the coma is all but gone, but there are long irregular nebulous tails in various directions." (In the night-glass, before this observation, there appeared distinctly a forked swallow-tailed appendage going off from the head, the branches being of unequal length and brightness, and making an angle of about 45° with each other. These, as is evidently seen in Fig. 4, Pl. XV., are the remains of the coma, the portion of which, to the *s p* side, formed the nearest approach to a tail which the comet exhibited after its perihelion.)—"Twenty feet. The nucleus is now no longer a dim, misty speck, but a sharp brilliant point. I cannot, however, '*raise a disc*' on it, at least not a well-defined one; but the light comes on so suddenly, it is like a planetary nebula a little hazy at the edges, 2″ or $2\frac{1}{2}$″ in diameter, $16^h\ 0^m$ M. T. Being now high, and the telescope acting to admiration (nothing ever equalled the definition of *stars* to-night), I see a sharp, all but planetary disc, diameter fully $1\frac{1}{2}$″, quite distinct from the haze about it. Power 320 shows it well. It is like one of Jupiter's satellites in a thick fog of hazy light. Nothing can be more delicate and regular than the curve of the head and the symmetry of the whole upper part of the figure." The continued dilatation of the comet on this and the subsequent nights is well exhibited in the figures of Plates XV. and XVI., which are all on the same scale. The observations of this night conclude with the following memorandum:—"So ended a most memorable night. I can

hardly doubt that the comet was fairly evaporated in perihelio by the heat, and resolved into transparent vapour, and is now in process of rapid condensation and re-precipitation on the nucleus."

(366) The 29th of January was cloudy, and my observations on the 30th were cut short by clouds, after procuring a few equatorial measures. The nucleus and interior comet were, however, now much more developed, so as to be well seen in this instrument with its power 170, which had not hitherto been the case. On the 31st, the 20 feet was again brought into action, when the comet appeared as in Fig. 1, Pl. XVI. It was now so much dilated as more than to fill the field of view (15′) in length, and nearly so in breadth; the right, or southern side, however, being still the longer and brighter, and the termination irregular and indistinct. Every trace of coma had disappeared, as had also the false tail or appendage to the southern arc of the parabolic envelope. The clear parabolic outline of the head was seen free from any mistiness or vaporous appearance, and in its full beauty, and certainly a more delicately formed and soft, yet well defined, outline than it presented on this night, could not be imagined. It was indeed a charming object. My journal compares the *rounding off of its edges* to that of the wane-cloud, occasionally seen on the Table Mountain in certain stages of a south-east gale. The simile, though apposite, conveys no illustration to a European reader. That of a transparent gauze or alabaster vase illuminated from within may be more successful. All idea of vagueness or confusion connected with an ill defined and fluctuating coma being now absent, an impression of regularity of structure and of precise and definite laws obeyed in its constitution, was no less strongly conveyed by this view of it than by that of the body of Jupiter or Saturn. From this night may be dated the commencement of the development of the true tail, viz., the prolongation into a regular train of the parabolic envelope, aided in its general effect by the similar prolongation of the ray or internal comet, which had now become very conspicuous. The coma from this time appeared no more, but in the progress of the comet towards its final extinction, the semblance of a new coma arose from the dilatation of the mass of internal light immediately surrounding the nucleus, after the final dissipation of the envelope, and which, from being at first a subordinate and inconspicuous part of the phenomenon, became by degrees a leading feature, and at last may be said to have constituted the whole visible comet, the infinitely minute and hardly perceptible nucleus excepted.

(367) The comet on this night (January 31) was full of small stars, and in its course passed tangentially over one at the edge of the densest part of the paraboloid, while another was swept across by the axis of the Ray. And I may here mention, once for all, that among the innumerable stars of all magnitudes, from the ninth downwards, which at various times were seen through it, and some extremely near to the nucleus (though none *exactly on it*), there never appeared the least ground for presuming any extinction of their light in traversing it. Very minute stars indeed, on entering its brighter portions, were obliterated, as they would have been by an equal illumination of the field of view; but stars which before their entry appeared bright enough to bear that degree of illumination, were in no case, so far as I could judge, affected to a greater extent than they would have been by so much lamp-light artificially introduced.

(368) February 1. Under the joint influence of a moon nearly full and the morning twilight, the comet was much enfeebled. Its outline, however, continued quite distinct; so

that, when brought up to the edge of the field of view of the 20 feet, the want of fitting of its convexity into the concavity of the field circumference was apparent by a narrow darker lunule at the sides of the vertex. The nucleus was grown more bulky, hazy, and ill defined, and *its* tail very strong. From this time till the 11th February, the moon approaching and passing the place of the comet, caused the 20 feet observations to be suspended—the equatorial only being used for determinations of its place, and for such measurements of dimension as could be procured, which, however (for the cause assigned), ceased to be practicable after the 4th, though it still continued to present a perceptible and constantly dilating outline. On the removal of the moon the dilatation had become so great, and the envelope so faint, that no more micrometric measures of dimension could be procured. The 20 feet observations were resumed on the 11th, on which day it was seen as in Fig. 2, Plate XVI., omitting most of the stars of which a great multitude bespangled it, and is described as "a superb object, but grown much too large for the grasp of this telescope with its sweeping power. Tried it with the Huygenian eye-piece of the night-glass, which improves it much. The nucleus now is the most conspicuous part, being vastly brighter than the rest, p s v m b M almost to a star. I see no increase of brightness at the edges as if it were a shell. The outline is that of a planetary nebula, somewhat hazy at the edges with this low power. With 180 much less definite: Δ R A between nucleus and vertex = $35^s.50$ (*almost exactly* occupying the interval between the wires) = $452''.7$." The elongation of the paraboloid was now such as to merit its being regarded as a true tail, and from this time forward its appearance in the night-glass, finder, &c., was that of an ordinary comet, with a short, broad, parabolic tail, which on the 15th Feb. occupied $\frac{3}{4}$ the radius of the field of the equatorial finder, or about $40'$.

(369) On the 17th, in the 20 feet, with the above mentioned Huygenian eye-piece, it was "dilated to a vast size, and no longer *sharply* defined, but yet the outline well made out, the nucleus pretty sharp, all but stellar, and *much brighter than ever seen before*, but the interior cometic tail hardly perceptibly brighter than the general tail." On the 19th, "The nucleus and *its* coma very bright, and highly condensed. The parabolic envelope hardly to be made out, and evidently distorted. The right (south) side of the envelope is best defined, and tolerably sharp. The left, especially towards the vertex, is very irregular in shape, and extends far out to near a star 7 m." See Fig. 6, Pl. XIV, of which the scale is much reduced in proportion to the other figures.

(370) From this time forward, the envelope continued still to dilate, becoming, however, worse defined and fainter, till at length, on the 18th of March, all trace of a visible outline had disappeared. "20 feet—the nucleus is singularly bright compared with the nebula, which is diffused, and loses itself insensibly. An immense region around it is dimly lighted with a nebulous light, but no form is traceable with the sweeping power." On the 22d March it was taken in a regular sweep on the meridian, and is described as "v v v s v v m b M to a well concentrated but not stellar nucleus, $4''$ diam. R A $11^h\ 45^m\ 25^s.4$; N P D $114°\ 41'\ 22''$ (for 1830)." The tail of the nucleus or the "Ray" had entirely disappeared, and henceforward it presented only the appearance of a round nebula, highly and very suddenly condensed in the middle (in which state it is figured in Fig. 7, Pl. XIV, on May 3), gradually dying away till finally lost.

(371) Four things in the post-perihelion history of this comet are especially remarkable: 1st, The astonishingly rapid dilatation of the visible dimensions; 2d, The preservation of the same

regular geometrical form of the dilated and dilating envelope; 3dly, The rapid disappearance of the coma; and, lastly, the increase in density and relative brightness of the nucleus. As regards the dilatation, the following synoptic table of the measures of the several parts as taken with the equatorial by direct micrometric measurement, or with the 20 feet by differences of R A and angles of position, will best express the fact. In this table, letters of reference are attached to each observation, capitals denoting equatorial measurements, and small letters 20 feet determinations.

Date. 1836.		Distance of Nucleus from Vertex. ″	Mean Time of Observation. h. m.		Length of Paraboloid. ″	Mean Time of Observation. h. m.		Breadth of Paraboloid. ″	Mean Time of Observation. h. m.		Length of Ray. ″	Mean Time of Observation. h. m.		Position of Axis of Ray. °
Jan. 25 ..	A	118.3::	13 38	C	229.4	13 38	E	237.3	14 15	g	91.7	15 40	k	276.8
	b	95.0	15 23	D	196.7::	16 25	F	252.0	16 29					
Jan. 26 ..	A	110.9	14 31	C	311.4	14 21	E	328.9	14 25	g	159.5	15 51	k	276.3
	b	121.3	16 2	d	308.9	15 40	F	333.5	14 27					
Jan. 27 ..	A	160.4::	14 45	C	400.6	14 42	E	422.2	14 40				k	277.3
	b	154.0	15 27	d	472.7	15 29								
Jan. 28 ..	A	164.5	14 53	C	482.3	14 51	E	497.2	14 46	G	291.2			
	b	171.1	16 12							h	381.4			
Jan. 30 ..	A	207.0	14 31											
Jan. 31 ..	A	218.2	14 45	C	739.6	14 50								
Feb. 1....	A	230.1	14 55	d	900.0	15 15	E	823.3	14 50					
							F	668.4::	14 55					
Feb. 2....	A	258.4	14 57				E	939.2	15 5	G	561.7		K	282.0
							F	835.3	15 3					
Feb. 4....	A	287.6	15 0				F	937.7						
Feb. 11 ..	a	452.7	13 56											

NOTES.—January 25—A, very uncertain, owing to the difficulty of seeing the nucleus; D, in strong morning twilight, too small; g by Δ R A of nucleus and extremity of Ray.

January 26—b, by a mean of two differences of R A of nucleus and vertex, mean 9ˢ.28; d, by Δ R A = 23ˢ.63; E, diameter in declination of the best defined oval portion; F, ditto ditto, perpendicular to axis of the comet; g. Δ R A = 12ˢ.125.

January 27—A, very difficult, uncertain measure; b, Δ R A = 13ˢ.125; d, Δ R A = 36.19; k, by two measures exactly agreeing.

January 28—b, by Δ R A = 13ˢ.125; C, cutting deep into the thin base of the paraboloid; E, diameter in declination of the most spherical mass.

January 31—C, by Δ R A = 57ˢ.0.

February 1—C, length just contained in field 15′ diameter; E, greatest breadth of paraboloid; F, breadth across nucleus, or apparent parameter. The same is also indicated by these letters on February 2 and February 4.

(372) The only element in these measurements which is sufficiently definite and comparable throughout the series, and at the same time little affected by the unequal lights of the telescope used, is the distance of the nucleus from the vertex of the paraboloid. Calculating on this element, and rejecting the equatorial measures of Jan. 25 and Jan. 27, on which, from the circumstances of the measures, no dependence can be placed, and taking means of those of Jan. 26 and 28, we find the following extraordinary series of values of the apparent, and real bulk of that definite segment of the paraboloid, which may be conceived cut off at its vertex by a plane

at right angles to its axis passing through the nucleus. The real bulk is derived from the apparent, by multiplying it by the cube of the distance from the earth, as given by Mr. Stratford's ephemeris In both, the volume for Jan. 25 is taken as unity.

Date.	Apparent Volume.	Real Volume.	Date.	Apparent Volume.	Real Volume.	Date.	Apparent Volume.	Real Volume.
January 25..	1.000	1,000	January 28..	5.511	5.179	February 1..	14.010	12.242
,, 26..	1.825	1.789	,, 30..	10.345	9.314	,, 2..	20.125	16.953
,, 27..	4.260	4.089	,, 31..	12.113	10.672	,, 4..	27.743	22.343
						,, 11..	108.210	74.303

From which it appears, that although the approach of the comet to the earth accounts for some considerable part of the apparent dilatation of volume, yet, allowing for the full effect of this cause, the definite segment in question had actually enlarged to 74 times its original bulk in the 17 days elapsed between the extreme observations. The total volume, however, or the solid content of the *whole visible paraboloid,* had increased in a much greater proportion, viz., in the interval from Jan. 25 to Feb. 1, (the last day on which measures of the total length and breadth were procured), in the ratio of 1 to 41.605, instead of 1 : 12.242, as in the table.

(373) A most singular consequence follows from this. If we project the measured distance of the nucleus from the vertex on a chart of engraved squares, taking the time elapsed in days since a given date (say Jan. 0), for the abscissa, and the distance in question for the ordinate, we shall find the locus of the interpolating curve to be very nearly a straight line, and the ordinate to be expressed very nearly by the equation.

$$(t - 21.07) \times 21'' = y$$

and, in fact, if we compare the distance in question as calculated from this formula with that resulting from actual measurement, we find them to correspond as follows:—

Date = t.	Nucleus from Vertex. Measured.	Nucleus from Vertex. Calculated.	Date = t.	Nucleus from Vertex. Measured.	Nucleus from Vertex. Calculated.
Jan. h. m.	"	"	Jan. h. m.	"	"
25 15 23 = 25.64 ..	95.0	96.0	31 14 45 = 31.61	218.2	221.3
26 14 31 / 16 2 } = 26.64 .. (mean)	116.1	116.9	Feb.		
27 15 27 = 27.64 ..	154.0	138.0	1 14 55 = 32.62	230.1	242.5
28 14 53 / 16 12 } = 28.69 .. (mean)	167.8	160.0	2 14 57 = 33.62	258.4	263.5
			4 15 0 = 35.63	287.6	307.0
			11 13 56 = 42.58	452.7	451.7
30 14 31 = 30.60 ..	207.0	200.1			

(374) We see by this comparison, that the *apparent linear dilatations* of the envelope was nearly uniform during the whole interval embraced by my observations, so long, at least, as it continued measurable, and that the mean rate of that dilatation was 21″ per diem on the vertical distance. Now, if we calculate backwards, on the hypothesis of this rate having been previously observed, *i. e.,* if we resolve the equation $t - 21.07 = 0$, or take $t = 21.07 = 21^d\ 0^h\ 10^m$, we

arrive at the singular conclusion that on the 21st of January, at $0^h\ 10^m$ P. M., the envelope *had no magnitude*, that in short, at that moment, a most important physical change commenced in the comet's state. Previous to that instant, it must have consisted of a mere nucleus, a stellar point, more or less bright, and a coma more or less dense and extensive. At that instant, the formation of the envelope commenced, and continued in the manner and at the rate above described. The "Ray," or internal comet, no doubt, also commenced its existence at the same instant.

(375) Laying aside for a moment all speculation as to the physical interpretation of this strange fact, I must now notice a most remarkable observation (unknown to me at the time of drawing the above conclusion), which corroborates in a striking and unexpected manner the result arrived at. On the night of the 22nd January,* M. Boguslawski, Professor of Astronomy at Breslau, actually observed the comet *as a star* of the 6th magnitude, a bright, concentrated point, which showed no disc with a magnifying power of 140: and that it actually *was* the comet, and no star, he assured himself by turning the telescope, the next night, on the place where he saw it. It was gone. Moreover, he had taken care to secure, by actual observation, the place of the star he had observed. That place agreed with the calculated place of the comet. Certainly better evidence could not be had.

(376) The above statement rests on the authority of a letter from M. Boguslawski to the late Dr. Olbers, which that venerable astronomer had the goodness to show me on the occasion of a visit I made to him at Bremen on July 27, 1838. Not having a copy of that letter, and wishing for more precise information, I wrote to M. Boguslawski on the subject, and was favoured by him with a reply, dated Breslau, Sept. 20, 1838, of which the following is an extract:—

"I saw the comet without any diameter, not on the night of Jan. 21-2, but of Jan. 22-3, between $17^h\ 36^m.8$ and $18^h\ 3^m.7$ M T at Breslau. But this very circumstance agrees better with your observation and measurements than you have found yourself. One need only derive from your observations another very plain curve, which will bend still closer to your measurements than yours,† viz.:—

Date.	Your measurements.	Your Curve.	The New Curve.
	″	″	″
1836. Jan. 25.5	93	93	93.0
26.5	119	114	119.0
27.5	144	135	142.8
28.5	168	156	164.4
30.5	201	198	201.0
31.5	216	219	216.0

"and this prolonged backwards gives:—

Date..........	January 25.5;	24.5;	23.5;	22.5;	22.45.
Ordinate	93.0;	64.8;	34.4;	1.8;	0.0.

* In a statement of this curious fact to the British Association, at Newcastle, printed in their Report for 1838-9, the date is given as the 21st, but erroneously.

† This is perfectly correct. The interpolating curve *drawn, as I had drawn* it, does actually deviate from the straight line assumed as its mean representative, in the manner M. Boguslawski indicates. It is concave towards its abscissa from January 25 to January 31, and convex towards the same line from that epoch to February 11:

"The zero point of the abscissa and of the dilatation of the nebula of the comet will be Jan. 22.45 = Jan. 22 $10^h\,48^m$. I observed the comet, like a star, at $17^h\,50^m$, therefore $7^h\,2^m$ after that calculated catastrophe. It follows, indeed, that the radius of the comet according to the curve must have been then already $9''.5$, and, therefore, the diameter $19''$. But, having not the slightest diameter, although one of $3''.45$ (that of Uranus), by a magnifying power of 140, was lately sufficiently evident—one is, perhaps, obliged to believe that the motion of the dilatation at the beginning was still faster than the equation of this curve expresses."

(377) Mr. Maclear observed the comet on the 24th of January, and assigns $2'\,11''$ for the diameter of the disc on that day. It was then so nearly circular (see the beautiful engravings accompanying his paper), that the half of this, or $65''.5$ may very properly be taken for the distance from the nucleus to the vertex on that night. A decrease of $21''$ on 93, would give $72''$ for this distance. This observation, therefore, corroborates the idea of a more rapid rate of increase in the earlier stages, and agrees very closely with M. Boguslawski's curve.

(378) It will not be necessary to enter into any calculation of the comet's distance from the sun at the moment of these observations, to warrant our rejection of an hypothesis such as that of M. Valz, which makes the volume depend *directly* on that distance. Undoubtedly, its recess from the sun is *ultimately*, but *indirectly*, the cause of the observed increase. The question is only as to the *modus operandi*. The perihelion passage, it will be borne in mind, took place on the 15th of November, and it was therefore not till the 83rd day after that event that the formation of the envelope commenced. Now, during these 83 days, it is certain that a process of refrigeration had been going on, both in the nucleus, and in the transparent and vaporous matter, if any, with which it was surrounded. It is hardly possible to imagine a case more corroborative of the view taken of this subject in my paper on Biela's comet (Mem. Ast. Soc. Vol. VI. pp. 104, 105). According to the theory there suggested, the surface of the nucleus must be supposed to have cooled down at this precise epoch to the *dew-point* (granting the extension of such a time to the point of condensation of the vapour, whatever its nature, present in the cometary atmosphere, but not constituting the whole of it). At this instant, therefore, according to that theory and in conformity with all we know of the laws of vaporous condensation, must have commenced the formation of a mist, first, precisely in contact with the radiating surface, and, by degrees more or less rapid, ascending above it, and limited (as we actually see radiation fogs in our valleys or on extensive plains in very calm nights), by a definite upper surface, the seat of a fresh process of radiation. As this *superior vapour-plane* attains a higher and higher level, corresponding to a less and less actual density, both of the atmosphere and vapour, its surface, without losing its geometrical form, necessarily becomes less and less visible and conspicuous; acquiring as it were, a greater tenuity, and becoming more filmy in its texture; being, in fact, nothing else than a boundary surface between a transparent medium above, and a misty one diminishing in opacity as the level rises, below.

(379) It is this superior vapour plane which constitutes, in our conception of the matter, the visible surface of the envelope. As the envelope increases in dimension, that surface, for the reason adduced, must continually become more faintly outlined, and at length disappear

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indicating a more rapid approach to the abscissa previous to January 25 than the straight line would give. Having no observations, I did not think it necessary to go into the minutiæ of its flexure.

altogether; an additional cause for which will be the removal of reflective matter from below, by subsidence into the nucleus or into the axis of the paraboloid (according to the peculiar laws of cometic aggregation, of which more presently), as we see a cloud subsiding in rain beneath, and accumulating in visible volume above.

(380) If the condensible vapour were everywhere distributed spherically around the nucleus, so as to have equal density at equal distances, the form of the envelope would necessarily be spherical, because, on account of the exceeding tenuity of the cometic atmosphere, its posterior portion is no way shaded by its anterior, but every part, interior and exterior, equally exposed to the sun's influence, or very nearly so. That the form is in fact not spherical, but paraboloidal, or very eccentrically elliptic, instructs us in an important and truly wonderful fact, viz., that *the surfaces of equilibrium of the vapour in its transparent state* are so; that in fact, *although not seen, the envelope existed* as a transparent atmosphere—a tail *in posse*, though not to our eyes *in esse*, and of its full extent, prior to the epoch of its commencing visibility, and probably prior to the perihelion passage.

(381) If we now inquire by what forces it is possible that such a form of equilibrium can be maintained, we shall at once perceive that the laws of gravitation, as at present recognized, are altogether insufficient to account for it. Such a form, as one of equilibrium, is inconceivable without the admission of repulsive as well as attractive forces. But, if we admit the matter of the tail to be at once repelled from the sun and attracted by the nucleus, it no longer presents any difficulty. It is evident, without going into any geometrical calculations, that the effect of the sun's repulsion on such an atmosphere must be to distort it from the spherical form it would assume in virtue of its gravitation to the nucleus alone—to press the particles on the side of the sun nearer to, and to drive those on the opposite side farther from it, so as to give rise to an oval form, the length of which will be the greater in proportion to its breadth the more energetic the repulsive force is supposed; and that by assigning to that force a sufficient energy, the oval in question may be prolonged to any length, or the remoter particles even driven altogether beyond the coercive range of the nucleus, and carried out into space.*

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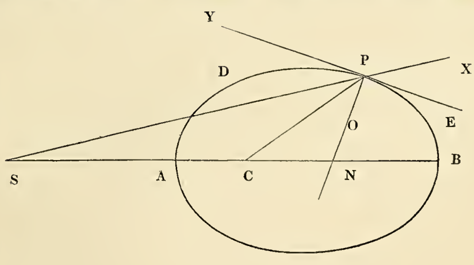
* The resultant of the two forces in question, the one directed *from* the sun, or in the direction P X in the figure (where S is the sun and C the nucleus), and the other to the nucleus, or in the direction P C, will necessarily lie in a direction P O, intermediate between them, which, if prolonged, must cut the axis in some point N further from the sun than C. Now, if A P B be the surface of the comet's atmosphere, this resultant must necessarily be in the direction of a normal to it, supposing it in equilibrio. The angle C P Y, therefore, will necessarily be less than a right angle, so that the portion P D A of the surface will lie wholly within, and P E B wholly without a circle, having C for a centre, and C P for a radius. The form, therefore



(382) Nor let any one be startled at the assumption of such a repulsive force as here supposed. Let it be borne in mind that we are dealing (in the tails of comets) with phenomena utterly incompatible with our ordinary notions of gravitating matter. If they be material in that ordinary received sense which assigns to them only inertia and attractive gravitation, where, I would ask, is the force which can carry them round, in the perihelion passage of the nucleus, in a direction continually pointing from the sun—in the manner of a rigid rod swept round by some strong directive power, and in contravention of all the laws of planetary motion, which would require a slower angular movement of the more remote particles, such as no attraction to the nucleus could give them, supposing it ever so intense? The tail of the comet of 1680, in five days after its perihelion passage, extended far beyond the earth's orbit, having in that brief interval shifted its angular direction nearly 150°. Where can we find, in its gravitation either to the sun or to its nucleus, any cause for this extravagant sweep?

(383) But again, where are we to look (if only gravity be admitted) for any reasonable account of its projection *outwards from the sun,* putting its angular motion out of the question? Newton calculates that the matter composing its upper extremity quitted the nucleus only two days previous to its arrival at this enormous distance. A projectional velocity much exceeding that of the comet itself in perihelio (i. e. exceeding that which the sun's attraction would generate in a body falling from infinity) would be necessary for this purpose. If the motion of matter be a criterion of the direction and intensity of the forces acting upon it, assuredly we can look nowhere but to a force directed from the sun, and that of an intensity far exceeding its gravitating energy on ordinary planetary matter, for the origin of such a movement (supposing it real).

(384) The manner in which Newton deals with this phenomenon is somewhat unaccountable. Discussing the various hypotheses advanced on the subject, this, among others, presents itself as a speculation of Kepler. "Alias particulas tam leves quam graves dari posse existimat, et materiem caudæ *levitare,* perque levitatem suam a sole ascendere."—Princip. III. prop. 41, Leseur and Jacquier, iii. 652. But he dismisses it summarily on the ground of the induction of a gravity proportional to inertia in all *terrestrial* bodies, and substitutes in its place a theory of the ascent of matter rarefied by heat in the solar atmosphere or the ether itself, in a mode precisely analogous to a suggestion of Fresnel respecting the cause of the ascent of clouds in our atmosphere. It is surprizing that a mind so penetrating as Newton's should not have felt the inadequacy of the means to the end in this account of the matter. Granting all the machinery of this hypothesis, ether, solar atmosphere, and rarefaction, still the ascent has to be effected ultimately by the sun's attraction, *i. e.,* by the difference of the gravitations towards it of the displaced and displacing masses; and this difference has to effect at once the descent of the displacing, and the ascent of the displaced ether (the latter loaded with matter heavier than itself); the difference of the moving forces acting on more than the sum of the masses put in motion; as in the case of two unequal weights suspended on the arms of a balance in which the sum of the bodies has to be set in motion by the difference of their weights. And even granting that from such a combination an ascending velocity could be generated greater than any

(whatever be the *laws* of the two forces, provided only their *directions* be as supposed) will necessarily be such an elongated or oval figure as described in the text.

Where the form is described as *paraboloidal,* this is of course to be understood not as designating strictly a conic parabola, but only a form having a general resemblance, in the neighbourhood of its vertex, to such a solid.

descending velocity which the sun's attraction could directly produce under any circumstances on a body falling freely (a thing clearly impossible), it is still only the dilated æther which is so driven upwards, and we are called upon further to admit the possibility of its carrying up with it the matter of the tail, while yet, on the other hand, the same æther is throughout assumed to be incapable (owing to its excessive tenuity), of resisting, when itself quiescent, the motion of cometary matter, however rapid. And all this in the face of the resistance of the æther to the motion of an upward current *of its own substance* still more attenuated. What follows, respecting the angular motion of the tail when so produced, is even more difficult to reconcile with the exceeding clearness and precision of Newton's views in general.

(385) Kepler's hypothesis of a simply *levitating* matter as the constituent substance of the tail is, however, insufficient. Supposing the tail to have no attraction for the nucleus, and to be merely projected with it into the sphere of the sun's action, they would at once part company, the tail describing an hyperbola convex, and the nucleus a parabola concave towards the sun. To make the hypothesis available, it is indispensable to superadd that of nuclear attraction. Taken then as a whole, the compound mass of the comet is urged towards the sun by the difference of the total attractive and repulsive forces, and so long as the repulsive power is insufficient to separate them, or analyse the compound, they will revolve together as one body, continually elongating itself as it approaches the sun, and *on the position of whose larger axis the sun exercises a directive power, as it would on a magnet, if itself magnetic; or rather, as a positively electrified body would on a non-conducting body of elongated form having one end positively, the other negatively excited.**

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* It is prudent, to say the least, in such hypotheses to keep clear of specialties, yet I cannot help remarking that the conception of a high degree of electrical excitement in the matter of the tail (of the same character with that of a permanent electrical charge supposed to be resident in the sun), superadded to the ordinary conception of a gravitating nucleus would satisfy most of the essential conditions of the problem. That the sun's heat *in perihelio* does actually vaporize a portion of the cometic matter, there can no longer, I think, be any reasonable doubt. That in such vaporization, a separation of the two electricities should be effected, the nucleus becoming (suppose) negative, and the tail positive is in accordance with many physical facts. The circumstances of this vaporization, as they were seen to take place in Halley's comet, were highly favourable to such separation. The matter of the tail seemed to be emitted in violent jets and streams, as if from orifices or fissures in the anterior part of the nucleus (See M. Struve's extraordinary drawings in his *Beobachtungen des Halleyschen Cometen*), a state of things productive (as recent experiments have shown) of powerful electrical excitement. Moreover, it is worthy of notice that these jets, instead of continuing their course forwards towards the sun, appeared, in many instances, to have been driven back, in curved forms, towards the tail, as if unable, by reason of some opposing power, to advance in their original direction. That no such tumultuous phenomena should have taken place after the perihelion passage, when the tail was quietly subsiding under the cooling process, is precisely what might be expected; and, in short, I see no part of the phenomena of a comet which appears to stand out as irreconcilable with this view of the subject. The exceeding energy of the electric in comparison with the gravitating force as exerted on matter of equal inertia is strongly in its favour.

Should it be objected to this theory, that it supposes the sun to be in a permanently excited electrical state, and that, therefore, thunder-clouds in our atmosphere ought to be attracted to or repelled from it, and move accordingly, I would observe, in reply,—1st, That the matter of a cloud is almost infinitely denser than that of a comet's tail, and probably in a far less powerful state of electrical excitement, so that the inertia bears an incomparably greater ratio to the moving force: 2ndly, That our clouds float in a medium capable of resisting, effectually, any independent movement so generated in them, and of commanding completely their movements by its own: 3rdly, That we are by no means certain that *other* phenomena in meteorology, referable to this cause, may

(386) Supposing the approach of a comet to the sun to be such as to enable the repulsive force to overcome the attractive in those portions of its tail remote from the nucleus, they would, of course, be driven off irrecoverably. But what would now be the state of the remaining mass? Inertia and repulsion have been subtracted: of course, what is left has become *pro quantitate materiæ*, on both accounts more *attractively disposed* as a whole; the dimensions of the orbit must, therefore, contract. The periodic time will diminish. We have here presented to us a series of consequences identical in some of their leading features with those which, observed in the case of Encke's comet, have been attributed to resistance of the æther. Pursued into all their consequences, no doubt the two explanations diverge. For example, in the case supposed, the diminution of the periodic time will be more than in proportion to the diminution of the major axis of the orbit. But it may be doubted whether observation of a body so ill defined is yet precise enough to decide between them.

(387) The separation of a portion of the tail here contemplated could hardly be accomplished without carrying off some portion of the gravitating matter. Supposing the excess of repulsive power anyhow got rid of, a new comet might be formed. But there is another mode in which, without having recourse to a direct divellent action of the sun on the materials of a comet in perihelio, its separation into two may be accomplished, and a phenomenon produced like that presented in the early part of the present year (1846) by Biela's comet, which was actually seen to subdivide; the two portions subsequently journeying along quietly side by side in orbits differing very slightly from each other, and apparently quite undisturbed by any mutual attraction. It will, of course, have been noticed that, although (for the sake of simpler illustration), we have supposed, in what has been said above, the form of equilibrium of our envelope or tail to be assumed at every instant, yet in this, as in the theory of the tides (to which it properly belongs, and may be considered as in some sort a supplement), the true problem is a dynamical, not a statical one. The oscillations of a fluid covering a central body, may, as is well known to those who are conversant with the theory of tidal movements, under certain conditions as to the coercive power of that central mass, cease to continue of small extent, and may increase in magnitude beyond any limit which analysis is capable of assigning

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not exist and come to be observed. A sun so electrically charged, would induce opposite electrical states in the two hemispheres of day and night, the intensity of those states *depending greatly on the degree of conductibility to be attributed to the earth as a mass.* The electrical meteorology of day and night, indeed all electrical meteorology is in a state too little advanced to admit of satisfactory answers to a crowd of queries which here suggest themselves. Lastly, there may, after all, exist in nature other repulsive forces, whose existence can only be known to us by studying their "instantiæ luciferæ."

Without at all going into the question raised by Prof. Mosotti, whether gravitation be not a manifestation of statical electrical action (or rather, without here explaining the arguments, which seem to me opposed to such an idea), one thing is physically certain, viz.: That, the laws of the two powers being the same, the *apparent* gravitation of one spherical body on another, supposing their diameters very minute, compared with their mutual distance, may be increased or diminished in any ratio, or changed into an apparent repulsion (still following the same law), by communicating to them electrical charges of similar or opposing characters, and of a proper intensity. It thus becomes, at least, conceivable how the stars of a globular cluster may have their mutual gravitation—their tendency to collapse and produce a general catastrophe—counteracted, while yet each might have planets revolving within its own sphere of attraction (which would not be in the smallest appreciable degree affected by any charge permanently resident in *their* central body, provided their own state were that of neutrality). It will of course be understood that I attach no importance to such a speculation as this last.

even to the extent of destroying the continuity of the fluid, and separating it into distinct masses. Now, if the conditions of such an extreme case can ever be approached at all, it must be in that of a comet like Biela's, in which the coercive power of the nucleus is reduced in the utmost conceivable degree; it being a mere vaporous mass devoid of all cohesion or consistency, and mixed up, and probably almost coextensive with the tail. Its return to the perihelion will be watched with intense interest.

(388) That comets undergo a change of some kind in their perihelion passage, was a favorite speculation of Sir William Herschel. He considered this change to consist in a loss of some portion of their more elastic matter by which the remainder acquired a higher degree of consolidation. Thus, in Phil. Trans. 1812, p. 141, he says, "That," besides light, "many other elastic volatile substances may escape . . . . . . in so high a degree of rarefaction, is far from improbable."——"Then, since light certainly, and very likely other subtle fluids, also escape in great abundance during a considerable time before and after a comet's nearest approach to the sun, I look upon a perihelion passage as in some degree an act of consolidation." If this language be considered (as no doubt it is), somewhat vague, we are now at least prepared to assign a more definite meaning to it.

(389) The preservation of the geometrical form of the envelope of our comet (to return to Art. 371.), is undoubtedly indicative of a high degree of tranquillity, the definite action of perfectly regular forces, and at least a near approach to a state of equilibrium in the strata of which the mass consists. It proves also, if taken in conjunction with what has been said respecting its apparent dilatation, similarity of external and internal strata, precisely such as the laws of equilibrium would lead us to expect in an elastic fluid mass subjected to such forces.

(390) The rapid disappearance of the coma would seem to be referable neither to dissipation nor absorption into the head, but rather to its being swept off into the tail by the sun's action, and there deposited as part thereof. The "wing" of the 26th, and the "false tail" of the 27th January would seem to have been the matter of the coma thus drifted off. To trace the complete history of the coma, however, it would be necessary to have before us observations of its appearance in the months of December and the early part of January, which I am not aware of having been obtained.

(391) The ray or tail of the nucleus is also a highly instructive phenomenon. As the envelope dilated and grew fainter, this, on the contrary, while also dilating at the same rate, grew more intense up to the 1st February, after which time it faded, while the nucleus with *its* coma rapidly increased in comparative brightness. It seems hardly possible not to recognize in these changes the effect of the gradual deposition of the matter of the envelope; choosing the line of its axis as the course of the deposited particles in their progress to rejoin the nucleus.

(392) Mention is made in Art. 358, of certain artifices employed in the management of the equatorial, to ensure exactness, when the comet was growing faint. These consisted chiefly in the mode of using the thick pair of wires with which the micrometer was furnished, so as to take advantage of their visibility, under the faintest possible illumination, without interfering with the exactness of observation, so far as the stars of comparison (not unfrequently themselves faint objects) were concerned. This latter condition, it was found, could be secured by placing the

two wires side by side, not exactly in contact, but with the narrowest possible chink or interval between them. Thus disposed, in a dark field, the broad space covered by the wires, enabled them to be seen upon the comet, as if they formed a single dark line, while, on the other hand, the star, after disappearing behind the first wire, would be seen to glimmer for a moment through the chink and again to disappear previous to its final emergence, in the operation for determining the difference of right ascensions; and the momentary glimpse thus obtained of it between the wires, was taken as the instant of its transit. When "oblique transits" are to be taken, the same principle is equally applicable, and I can recommend it as very serviceable in all such cases.

(393) In taking differences of declination between the comet and the star of comparison, three methods were followed: 1st, The wires (A B) were roughly set on the comet and star, by passing from one to the other by the right ascension motion, then placing the instrument in advance of both, and clamping it, the first in order of R A was bisected by the wire A, and the other (on its coming up) by B. A second observation was then similarly made, only crossing the wires, and using B to bisect the first in order, and A the second, and so on alternately; or, 2ndly, supposing the comet to pass first, the wire A being placed at zero, was exactly covered by B, and the comet bisected by them as by a single wire, by the declination motion; then, on the star coming up, B was opened out till it bisected the star. This method could, of course, not be applied when the star preceded. 3rdly, The instrument being clamped, so as to allow both objects to pass, conveniently situated, through the field of view, both were, in succession, bisected by one and the same wire. In either of these modes of using the micrometer, the zero correction of the wires is eliminated, but the latter is undoubtedly preferable.

(394) In identifying the star compared, a conspicuous zero or fiducial star was always chosen, as near its place as possible, to be compared with *it* by differences of R A and N P D read off on the hour and declination circles of the instrument. In so doing, it was often necessary, in order to read off the latter circle, to shift the whole instrument through several hours of right ascension. Either owing to some instability in the support of the polar axis, or to the effect of sand blown into the Y, and adhering to that portion of the axis resting on it, which seldom came into use (a thing impossible to avoid in consequence of the nature of the soil and the violent and searching winds), it was often found that on restoring the instrument to a star after reading off, the bisection of the latter would be found materially deranged. This could always be prevented, indeed, by several times swinging the instrument to and fro over a larger arc in R A previous to commencing, and by very gentle handling afterwards, but the inconvenience was entirely done away with as a cause of error by proceeding as follows. The star first to be taken was brought into the centre of the field and bisected, and the declination circle (being of course clamped) was read off, by bringing the instrument round to the eye in R A. It was then restored to the star, which, if not found bisected, was *now rebisected by the micrometer screw* without altering the declination circle. The instrument was then transferred, by the regular application of both its tangent screws, to the other star, which was bisected by *the same wire*, but, this time, not by the micrometer screw, but by the declination motion. The difference of declination was now, of course, secured on the limb, and could be read off at leisure, without regard to any possible shift of bearing in the act of bringing it into a situation convenient for so doing.

(395) I will take this opportunity to mention, that the formulæ for computing the corrections

for parallax and refraction (for the latitude of Feldhausen) given in my paper above cited, Mem. Ast. Soc. x. p. 326, are entirely vitiated by typographical errors. The correct formulæ are as follows (a being, in addition to the notation there explained, the co-latitude):—

$$tan\ \mu = tan\ a\ .\ \cos h$$

$$P = -\frac{\alpha}{D} \cdot \frac{\sin h}{\sin p}; \quad Q = -\frac{\gamma}{D} \cdot \frac{\sin (p-\mu)}{\cos \mu}$$

$$P' = -\beta (p' - p) \cdot \frac{\sin h \cdot \cos \mu \cdot \cos (2p - \mu)}{\sin p \cdot \cos (p-\mu)^2}$$

$$Q' = +\delta \cdot (p' - p) \cdot \sec (p - \mu)^2$$

CHAPTER VI.

OBSERVATIONS OF THE SATELLITES OF SATURN.

(395) During the years 1835, 1836, and 1837, the ring of Saturn, and the orbits of its satellites were sufficiently open to permit the accumulation of a considerably extensive series of their angles of position with the meridian, or with the longer axis of the ring so disposed as to be available towards the more exact determination of their orbits; of which little is known with exception of the sixth, which is the largest and most easily observable, and whose elements and perturbations have been made the subject of elaborate investigation by Bessel. I consider, therefore, that the observations I have been able to make of these bodies, though confessedly imperfect, owing to their extreme faintness in the equatorial, and to the difficulty of obtaining any measures at all of position with the 20-feet reflector out of the meridian, may not be wholly without interest as a contribution to their theory.

(396) All the measures of position, whether obtained with the one or the other instrument, were taken with reference to the estimated centre of the body of the planet. In the equatorial, the use of a single thin thread placed across the satellite and the estimated centre was abandoned at an early period of the measurement, and the far preferable method of placing both the satellite and the whole body of the planet between the two thick wires opened, so as rather more than to include the latter, adopted. This mode of observing, which is excellently well adapted to the measurement of very unequal double stars, requires some little practice and familiarity to be equally satisfactory on the satellites of Saturn. Attention must be directed entirely to the globe and the satellite, studiously disregarding the ring, and filling up by imagination the contour of the globe where covered by the ring. This, if at first the cause of some hesitation and uncertainty, soon becomes familiar; the ring ceasing to offer any disturbance to the judgment, or to produce any bias in the measurement. The position of the wires is then only to be judged correct when a perfect symmetry of situation of the globe and satellite with respect to them is attained. To show the nature and extent of the discordances which exist in the measurement so conducted, I subjoin, as specimens, a few instances, selected impartially from the mass on record, of the individual measures of each satellite equatorially measured.

Satellite	Date.	Individual measures, including zero.					Mean.
		° ′	° ′	° ′	° ′	° ′	° ′
VII.	1835, June 18	212 5	212 50	211 50	......	......	212 16
„	June 20	240 55	241 20	......	......	......	241 8

Satellite	Date.	Individual measures, including zero.					Mean.
		° ′	° ′	° ′	° ′	° ′	° ′
VII.	1837, April 24	323 30	323 15	......	......	......	323 23
VI.	1835, May 27	245 30	245 10	245 15	244 45	244 45	245 5
„	June 10	113 33	115 8	113 38	113 48	114 18	114 5
„	1836, March 6	101 15	102 30	101 42	101 15	101 35	101 39
„	1837, April 9..........	103 13	103 5	103 20	102 55	102 50	103 5
„	May 21	319 10	319 30	317 30	318 10	318 15	318 31
V.	1835, July 21	79 48	78 28	78 13	78 43	78 23	78 43
„	1836, April 27	101 25	100 55	100 45	......	......	101 2
„	1837, April 1..........	111 27	112 37	111 57	......	......	112 0
„	April 7..........	266 0	265 35	266 5	265 55	266 5	265 56
„	April 9..........	77 25	77 25	77 15	77 20	77 45	77 26
„	May 21	131 50	129 40	128 35	131 10	......	130 19
IV.	1836, April 27	85 50	84 30	......	......	......	85 10

(397) Measures of the fourth satellite could, however, very rarely be procured so as to be in any degree satisfactory with the equatorial—of the third, never. The former, however, was often *seen*, and the latter also occasionally, though rarely. As to the two interior satellites, it is needless to state that no glimpse of either of them was ever obtained with this instrument.

(398) In the nomenclature above used, the satellites reckon outwards from the centre, seven in number; but as this practice is even yet not become general among astronomers,* and as I have found the equivoque practically annoying, and a source of frequent error and mistake, I have used for my own convenience, and shall continue to do so in what follows, a mythological nomenclature, which, however, I do not presume to recommend to the adoption of others, though I am persuaded that *some* nomenclature other than the equivocal one in actual use, will be found necessary by all who observe these bodies. The names I have selected are as follows:† viz., for

The exterior satellite, discovered by Cassini	Iapetus.
The bright satellite, discovered by Huyghens	Titan.
The exterior of the three satellites, discovered by Cassini	Rhea.
The intermediate of these three, discovered by Cassini	Dione.
The interior of them, discovered by Cassini	Tethys.
The exterior of the two, discovered by Sir W. Herschel	Enceladus.
The interior and smallest of all	Mimas.

* See Dr. Lamont's paper and tables of the "sixth" satellite (Astronom. Nachr. No. 316), meaning the second.

† As Saturn devoured his children, his family could not be assembled round him, so that the choice lay among his brothers and sisters, the Titans and Titanesses (*vide* Lempriere). The name Iapetus seemed indicated by the obscurity and remoteness of the exterior satellite, Titan by the superior size of the Huygenian, while the three female appellatives class together the three intermediate Cassinian satellites. The minute interior ones seemed appropriately characterized by a return to male appellatives, chosen from a younger and inferior (though still superhuman) brood. Should an eighth satellite exist, the confusion of the old nomenclature will become quite intolerable. I am not aware that a distant satellite of Jupiter (analogous to Iapetus and our moon) has ever been *looked for*. Would it not be worth a search?

(399) It was not until Feb. 28, 1837, that the single position wire of the 20-feet micrometer was exchanged for a double one, composed of two pretty thick *glass* threads (the *perfect* straightness of which can always be depended on if kept in a state of tension in a vertical position while cooling from fusion), well smoked to render them opaque and non-reflective. Until that date (that is to say, during all the series of measures recorded for 1835 and 1836 with the reflector), the positions taken with it are open to all the objections against the use of a single thread for this especial purpose. The positions in these years are, moreover, liable to an additional source of uncertainty, which has, no doubt, vitiated them materially—the difficulty, indeed, almost impossibility, of well adjusting the fixed wire to the parallel out of the meridian with an instrument suspended after the manner of the 20-feet reflector. This difficulty did not fail to make itself felt in the first attempt to take measures of the satellites. It was endeavoured to be overcome by adjusting the fixed wire to the line of Ansæ, and, in one instance, to the position of the great satellite (Observation of June 2, 1836). But the mode of doing this was not well considered. The wire once so adjusted was left unaltered during the whole of a set of measures (lasting, it is true, not many minutes), which, of course, inflicts a permanent error on each reading off. For these reasons, I place but little reliance on the 20-feet measures of the two first years in question.

(400) On the 28th of April 1837, however (the first occasion of using this instrument on Saturn after the change of wires), a mode of observation was adopted free from all objection of this kind. The line of Ansæ was chosen as a fiducial line, for which the moderate opening of the ring in that year did not yet unfit it, whatever it might have done a year or two later (in which case the great satellite must have been resorted to as a fiducial object, and *its* position otherwise determined). The zero, or single wire, was, however, not adjusted to the apparent line of Ansæ, nor, indeed, adjusted at all, but set at random, or, rather, so as to be most out of the way of the measures to be taken. The positions of the line of Ansæ, and of whichever satellite was under measurement, were then *alternately* taken between the double wires, and read off, *beginning and ending in each set of measures with the Ansæ.* Means then being taken of the readings, not the angle of position of the satellite, but the difference of its position and that of the Ansæ was obtained; and as the situation of the Ansæ is given to great accuracy in both the *Nautical Almanac* and the *Berlin Ephemeris*, it is easy thence to derive the true position of the satellite. In setting the moveable wires to the line of Ansæ, exactly the same mode of proceeding was adopted as in the case of a double star, only that in this case the *body* of the planet was disregarded, and the whole attention directed to the ellipse of the ring, so as to place it symmetrically between the thick wires. The following specimen of a series of observations executed in this way on May 4, 1837, will serve to explain the details of the procedure. A night of observation is purposely chosen, in which Enceladus was well seen and measured, and in which Tethys was observed through its inferior conjunction, without the least hinderance from its extreme apparent proximity to the ring and body of the planet.

S. T.		Ansæ or Satellite.	Microm. reading.		S. T.		Ansæ or Satellite.	Microm. reading.	S. T.		Ansæ or Satellite.	Microm. reading.
h.	m.		° d.		h.	m.		° d.	h.	m.		° d.
13	42	Ansæ	59.5	☽ − A = 59°.25	13	47	Ansæ	70.0	13	53	Ansæ	72.1
		Tethys ..	121.7				Tethys ..	127.2			Tethys ..	129.0
13	45	Ansæ	65.4		13	49	Ansæ	67.8	13	55	Ansæ	68.9
							Tethys ..	133.0			Tethys ..	137.0

S. T.	Ansæ or Satellite.	Microm. reading.	
h. m.		° d.	
	Tethys ..	137.5	☽ − A = 62°.92
13 57	Ansæ	70.3	
14 7	Ansæ	76.1	☽ − A = 199°.92
	Titan	278.8	
14 9	Ansæ	79.0	
	Titan	278.4	
14 11	Ansæ	80.3	
	Titan	279.0	
14 12	Ansæ	78.5	
	Titan	278.2	
14 14	Ansæ	79.5	
14 14	Ansæ	79.5	☽ − A = 172°.38
	Rhea	252.5	
14 15	Ansæ	78.6	
	Rhea	249.5	
14 17	Ansæ	78.0	
	Rhea	251.0	
14 18	Ansæ	78.4	
14 20	Ansæ	85.1	☽ − A = 329°.64
	Dione....	56.5	
14 22	Ansæ	89.1	
	Dione....	57.0	

Interrupted the measures to note (Enceladus) which is perfectly distinct, and equal to a star 15.16m. From its situation I can hardly have a doubt of its being a satellite. It is beautifully defined. Yet, N.B. there is a great number of stars about this part of the sky. Sent for * * * who after a few trials saw it well. Put on a field-bar eye-piece. Perfectly well seen by both of us. Its distance from the ring's edge is $1\frac{1}{3}$ its breadth.

S. T.	Ansæ or Satellite.	Microm. reading.	
h. m.		° d.	
14 48	Ansæ	104.0	☽ − A = 327°.25
	Dione....	71.0	
14 49	Ansæ	103.7	
	Dione....	69.2	
14 51	Ansæ	102.8	
	Dione....	71.0	
14 52	Ansæ	102.1	
14 52	Ansæ	102.1	☽ − A = 342°.17
	Iapetus?	84.2	
	Ansæ	101.0	
	Iapetus?	95.4	
	Ansæ	103.0	

[The first of the objects here taken proved to be the true satellite, the other a star.]

14 55 (Enceladus) is now fully as far from the edge of the Ansæ as that edge is from the limb of the planet. When first seen it was somewhat *south* of the line of Ansæ. It is now just on the axis. Never was anything more perfect than the definition of Saturn to-night.

S. T.	Ansæ or Satellite.	Microm. reading.	
15 3	Ansæ	108.5	☽ − A = 77°.02
	Tethys ..	188.0	
15 4	Ansæ	112.0	
	Tethys ..	185.4	
15 6	Ansæ	109.4	
	Tethys ..	187.2	
15 8	Ansæ	109.5	

Perfectly satisfactory measures of Tethys in or very near its inferior conjunction. Quite easy, though very close to the edge of the ring.

S. T.	Ansæ or Satellite.	Microm. reading.	
15 10	Ansæ	109.0	☽ − A = 181°.85
	Enceladus	290.9	
	Ansæ	108.5	

Perfectly sharp distinct measure. Shifted micrometer.

S. T.	Ansæ or Satellite.	Microm. reading.	
h. m.		° d.	
15 14	Ansæ	114.2	☽ − A = 181°.83
	Enceladus	298.2	
	Enceladus	295.3	
	Enceladus	297.3	
15 17	Ansæ	116.0	
15 34	Ansæ	124.8	☽ − A = 94°.17
	Tethys ..	218.8	
15 35	Ansæ	127.2	
	Tethys ..	219.6	
15 37	Ansæ	127.0	
	Tethys ..	222.4	
15 41	Ansæ	125.4	

15 41 } Examined in all sorts of
15 56 } ways. 12 inches aperture and power 240 suits it best. At 16 h. 3 m. S. T., Enceladus is somewhat nearer to Saturn, and very decidedly *north* of the axis of the ring Ellipse.

S. T.	Ansæ or Satellite.	Microm. reading.	
16 9	Ansæ	143.0	☽ − A = 183°.40
	Enceladus	325.8	
	Ansæ	142.8	
	Enceladus	326.2	
	Ansæ	142.0	
16 22	Ansæ	141.5	☽ − A = 118°.9
	Tethys ..	260.0	
16 24	Ansæ	142.8	
	Tethys ..	262.4	
16 28	Ansæ	142.6	

16 41 Left off having first seen Enceladus still nearly at the same distance, or, if any thing, a very little nearer, but decidedly advanced in position in its orbit. By this time the planet, were it a star, must have occulted it, as the motion was full upon it at the rate of nearly a semidiameter of the globe of Saturn per hour in right ascension.

(401) The following table exhibits a synopsis of all the measured (and some of the estimated) positions of the satellites as taken with both the equatorial and the reflector during the three years in question. No correction for Bias (See Art. 168), has been applied to the measures taken with the latter instrument, it being by no means clear that any such correction is needed in the mode of observing finally adopted, and in the earlier measures; it being quite uncertain whether it can be applied correctly. It will, of course, be understood that the estimated positions have no further use than to determine whether the object seen was or was not a satellite, and which. The list of measures, as originally drawn out from the registered observations was considerably more extensive, but has been reduced by striking out numerous observations of *stars* taken at the time for satellites, or at least possibly such (especially for Iapetus), but since ascertained not to have been so.

(402) In this table, the first column contains the date of the observation; the second indicates, by the letter E or R, whether the equatorial or the reflector was used; column 3 contains the name of the satellite observed; column 4, the estimated magnitude; column 5, the

mean time at Feldhausen; column 6, its angle of position finally resulting from the means of the measures (to which the mean time always corresponds), being the due application of zeros in the one instrument, and the appropriate modes of treatment in the other; lastly, column 7 contains the number of observations on the mean, of which the results in column 6 relies; the letter *d* in this column indicates that the position in column 6 is not the result of a micrometrical measure, but of the configuration as laid down in a diagram made at that time, and liable therefore to very great errors.

SYNOPSIS OF THE OBSERVED ANGLES OF POSITION OF THE SATELLITES OF SATURN.

Date.	Inst.	Satellite.	Mag.	M. T. h.	M. T. m.	Position. °	Position. ′	No.
1835								
May 18	E	Iapetus ..	11	10	52	85	55	1
		Titan	9′	10	46	336	15	5
				12	0	344	10	3
		Dione		12	21	83	35	2
19	E	Iapetus ..	11	11	23	87	±	d
		Titan	9	11	27	60	49	5
		Rhea	9′	11	33	88	23	3
20	E	Iapetus ..		9	7	91	48	2
		Titan	9	8	46	75	44	5
23	E	Iapetus ..	11	9	42	93	55	2
		Titan	8′	9	10	93	2	6
		Rhea	11	9	28	76	7	5
24	E	Iapetus ..	8	10	±	95	±	d
		Titan	8	9	46	98	2	5
		Rhea	10	10	4	92	39	5
25	E	Iapetus ..		8	40:	100	±	d
		Titan	8′	8	42	111	33	5
		Rhea		8	49	240	±	d
27	E	Titan		9	47	245	5	5
29	E	Titan	8	9	9	263	17	5
31	E	Titan	8′	7	33	270	36	5
June 1	E	Titan	8′	8	26	276	23	5
4	E	Titan		10	8	62	10	4
5	E	Titan		10	11	77	11	5
6	E	Titan	8′	9	17	84	0	6
		Rhea	10′	9	38	86	2	4
7	E	Titan		7	25	87	50	5
8	E	Titan	8	7	22	92	7	5
9	E	Titan	8′	9	35	98	58	5
10	E	Titan	9	8	58	114	55	10
12	E	Titan	9′	5	56	244	27	6
15	E	Iapetus ..	11	10	9	156	45	1
		Titan	10	10	2	268	28	3
		Rhea	9	9	57	85	5	4
16	E	Iapetus ..	11	9	52	172	45	1
		Titan	9′	9	41	272	28	3
		Dione ..	13	10	±	268	±	d
17	E	Iapetus ..	12	8	9	189	40	1
		Titan	8′	7	44	277	17	5
		Rhea	10′	7	50	260	5	4
18	E	Iapetus ..		7	7	212	15	3
		Titan		9	19	289	6	13
		Rhea		8	24	276	45	7
19	E	Iapetus ..	12	6	26	228	20	2
		Titan	10	7	26	337	52	11
				11	2	356	20	8
		Rhea	11	9	33	70	56	5
20	E	Iapetus ..	12	8	58	241	8	1
		Titan	9′	8	50	62	0	5
		Rhea	10	8	56	90	47	3
21	R	Iapetus ..		7	36	251	18	2
		Titan		7	42	81	36	1

Date.	Inst.	Satellite.	Mag.	M. T. h.	M. T. m.	Position. °	Position. ′	No.
1835								
		Rhea		7	33	211	48	4
				8	44	225	24	3
		Dione ..		7	38	237	24	3
		Tethys ..		7	34	263	30	1
		Enceladus		8	5	87	30	..
June 25	R	Iapetus ..		7	54	264	42	1
		Titan		8	1	97	42	3
		Rhea		8	41	101	6	5
		Tethys ..		8	51	271	48	6
26	R	Iapetus ..		7	53	265	18	1
		Titan		7	49	116	0	3
		Rhea		7	51	260	24	2
		Dione .. + Tethys ..		7	50	97	0	2
27	E	Titan		8	55	196	4	6
		Rhea		9	4	275	50	2
July 13	E	Titan		7	43	197	10	5
15	E	Iapetus ..	11	6	44	290	20	1
		Titan	9	6	17	257	47	5
		Rhea	12	6	40	274	45	2
		Dione ..		6	44	93	±	d
21	E	Iapetus ..	10	7	6	302	48	3
		Titan	10	6	53	344	3	12
		Rhea	10′	6	51	78	43	5
1836								
Jan. 10	E	Titan	10	15	16	278	4	5
Feb. 1	E	Titan	9′	15	14	85	8	3
4	E	Titan		15	39	112	25	5
5	E	Titan		14	49	138	38	3
9	E	Titan	9	16	6	265	13	5
		Rhea	11	16	24	74	52	2
Mar. 6	E	Titan		15	11	101	39	5
27	E	Titan		12	41	257	51	5
April 7	E	Iapetus ..	12	13	31	98	20	2
		Titan	12	13	25	101	31	5
14	E	Titan	9	11	16	271	36	2
21	E	Titan	8′	13	12	87	30	2
25	E	Iapetus ..	9	13	23	124	10	2
		Titan		13	15	159	17	8
26	E	Iapetus ..	10′	12	51	126	10	1
		Titan	8′	12	19	225	31	5
		Rhea	10	12	40	78	23	3
27	E	Iapetus ..	11′	12	28	130	50	2
		Titan	8′	12	11	250	45	4
		Rhea	10′	12	16	101	2	3
		Dione ..	12	12	26	85	10	2
May 3	E	Iapetus ..	11′	13	6	206	8	2
		Titan	9	13	0	326	24	4
		Rhea	11	13	4	264	18	2
12	R	Titan	9′	10	28	222	48	1

Date.	Inst.	Satellite.	Mag.	M. T. h.	m.	Position. °	′	No.
1836		Rhea	10′	10	29	260	18	1
		Dione ..	11	10	30	259	18	1
		Tethys ..	11	10	40	105	12	1
		Enceladus	15	10	41	81	18	1
May 13	R	Titan		10	±	252	±	d
		Rhea		10	±	291	±	d
		Dione ..		10	±	35	±	d
		Tethys ..		10	±	296	±	d
19	E	Iapetus ..		9	56	279	28	2
		Titan	11	9	49	322	42	5
22	E	Iapetus ..	10′	10	52	282	5	2
		Titan	9	10	32	80	37	5
24	E	Iapetus ..	10′	10	20	285	50	1
		Titan	9	10	9	95	0	3
		Rhea	10′	9	52	97	55	3
		Tethys ..	13	10	40	270	±	d
June 1	R	Titan		9	50	270	56	1
		Rhea		9	32	68	50	2
		Dione ..		9	48	325	44	3
		Tethys ..		9	30	316	26	1
		Enceladus		9	42	268	26	2
2	R	Rhea		8	42	84	39	2
		Dione ..		8	42	85	±	..
		Tethys ..		8	37	152	27	3
3	R	Titan		11	6	289	37	1
		Rhea		10	8	221	29	1
		Dione ..		10	10	262	35	1
		Tethys ..		9	39	14	32	1
				10	36	42	2	1
				11	0	56	50	1
		Enceladus		11	0	85	8	1
		Mimas ..		9	50	85	±	d
8	R	Iapetus ..		11	34	325	11	1
		Titan		11	30	88	59	1
		Rhea		11	27	261	5	1
		Dione ..		11	24	233	59	1
		Tethys ..		11	27	266	29	1
11	R	Iapetus ..		10	36	7	29 :	1
		Titan		10	30	115	47 :	1
		Rhea		10	31	92	23 :	1
		Dione ..		10	34	256	11 :	1
		Tethys ..		10	32	89	59 :	1
27	E	Titan		7	47	117	19	5
		Rhea		7	53	272	55	1
July 12	R	Iapetus ..	12	7	48	120	22	1
		Titan	9	7	32	100	22	2
		Rhea	11	7	35	80	22	2
		Dione ..	13	7	37	296	1	2
		Tethys ..	13	7	39	257	58	3
14	R	Iapetus ..		6	32	131	3	1
		Titan		6	34	167	39	4
		Rhea		6	23	244	3	2
		Dione ..		6	30	256	57	1
		Tethys ..		6	31	265	15	1
Aug. 11	E	Titan	9	6	26	88	13	3
		Rhea	12	6	34	274	15	1
1837 Mar. 12	E	Titan		12	50	232	46	5
		Rhea		13	1	324	5	1
		Dione ..		13	0	272	±	d
13	E	Titan		15	1	253	19	5
		Rhea		15	9	83	48	2
26	E	Titan		13	4	137	36	5
28	E	Titan		14	21	236	53	10
April 1	E	Titan	8′	14	5	280	37	5
		Rhea	11	14	16	112	0	3
1837 April 7	E	Titan	9	14	8	86	17	5
		Rhea	11	14	16	265	56	5
		Dione ..	12	14	22	92	15	1
		Tethys ..	13	14	22	92	15 :	1
8	E	Titan	9′	12	13	93	58	5
		Rhea	12	12	30	305	53	2
9	E	Titan	8′	14	5	103	5	5
		Rhea	10′	14	12	77	26	5
		Tethys ..	13	14	28	100	25 :	1
10	E	Titan	9	12	26	116	20	5
		Rhea	11	12	37	108	28	5
11	E	Titan	8′	13	55	144	15	5
		Rhea	11	14	7	241	37	3
12	E	Iapetus ..	10′	14	10	289	26	4
		Titan	9	13	53	200	27	6
		Rhea	12	14	5	275	35	2
13	E	Iapetus ..		15	10	290	0	1
		Titan		14	50	238	22	5
14	E	Titan	9	13	28	255	53	5
		Rhea	10′	13	26	92	10	3
15	E	Iapetus ..	10′	12	37	294	15	2
		Titan	9′	11	26	264	22	5
20	E	Titan		12	18	12	47	7
		Rhea		12	32	214	10 :	1
24	E	Iapetus ..	10′	14	16	323	23	2
		Titan	9	14	6	95	33	2
27	E	Iapetus ..	12′	13	57	355	5	2
		Titan	9′	13	37	148	6	5
		Rhea	11′	13	51	73	56	5
28	R	Iapetus ..		12	37	6	58	5
		Titan		11	57	196	20	16
		Rhea		12	12	105	2	4
		Dione ..		12	9	299	49	8
		Tethys ..		12	29	96	27	2
28	E	Iapetus ..	11	13	57	10	27	3
		Titan	9	13	47	206	37	3
		Rhea	10	13	51	107	30	3
		Tethys ..	12	13	52	97	±	d
29	R	Iapetus ..		12	20	21	46	4
		Titan		14	54	242	27	4
		Rhea		12	16	237	57	7
		Dione ..		12	6	93	13	5
		Tethys ..		12	9	282	13	6
29	E	Iapetus ..		13	54	27	5	2
		Titan		13	48	240	3	3
		Rhea		13	52	242	35	2
30	R	Iapetus ..	11	11	24	35	49	4
		Titan	10	11	8	256	21	3
		Rhea	11	11	15	277	42	3
		Dione ..	12	11	39	254	56	4
		Tethys ..	12	11	31	104	0	3
May 1	E	Iapetus ..	11	13	50	51	55	3
		Titan	8′	13	44	265	20	4
		Rhea		13	50	20	±	d
3	E	Iapetus ..		12	20	69	5	1
		Titan		12	14	280	36	4
4	R	Iapetus ..		12	2	73	5	1
		Titan		11	21	290	50	4
		Rhea		11	26	263	18	3
		Dione ..		11	46	59	21	5
		Tethys ..		11	2	153	50	5
				12	16	167	56	3
				12	45	185	5	3
				13	35	209	49	2
		Enceladus		12	33	273	15	6
5	R	Iapetus ..		12	26	75	17	1
		Titan		11	54	317	58	4

Date.	Inst.	Satellite.	Mag.	M. T. h.	M. T. m.	Position. °	Position. ′	No.
1837				h.	m.	°	′	
		Rhea		11	50	296	2	6
		Dione ..		11	42	138	45	7
		Tethys ..		10	7	343	48	3
				12	1	19	37	2
May 6	R	Iapetus ..		12	17	80	8	3
		Titan		11	46	17	32	6
		Rhea		11	19	71	57	4
		Dione ..		12	1	281	47	5
		Tethys ..		11	56	219	5	7
		Enceladus		11	47	83	45	4
				12	59	87	22 :	3
7	R	Iapetus ..		12	1	82	56	2
		Titan		11	36	60	11	3
		Rhea		12	8	102	5	3
		Dione ..		11	56	81	15	3
		Tethys ..		12	6	57	9	7
8	R	Iapetus ..		12	..	87	25	1
		Titan		11	33	70	±	d
		Rhea		11	43	232	11	3
		Dione ..		11	48	225	1	4
		Tethys ..		11	48	251	3	4
		Enceladus		12	11	263	3	3
9	R	Iapetus ..		13	21	88	59	3
		Titan		11	3	85	13	3
		Rhea		11	12	274	32	3
		Dione ..		13	9	309	15	2
		Tethys ..		13	14	78	50	2
		Enceladus		13	34	119	8	2

Date.	Inst.	Satellite.	Mag.	M. T. h.	M. T. m.	Position. °	Position. ′	No.
1837				h.	m.	°	′	
May 21	E	Titan	8	10	38	318	31	5
		Rhea	12	10	53	130	19	4
June 5	R	Iapetus ..		10	14	185	52	1
		Titan		9	42	293	2	3
		Rhea		9	49	270	30	2
		Dione ..	12	9	53	271	42	2
		Tethys ..	12	10	0	113	56	3
6	R	Iapetus ..		9	21	205	48	5
		Titan		9	1	319	13	4
		Rhea		9	3	327	48	4
		Dione ..		9	10	68	5	5
		Tethys ..		9	23	306	47	6
		Enceladus		10	28	276	3	7
24	E	Titan		9	42	63	15	5
25	R	Iapetus ..	10	10	44	284	10	2
		Titan	9′	10	39	80	0	2
		Rhea	12	10	33	82	9	3
		Dione ..	13	10	3	51	4	6
		Tethys ..	14	9	47	343	12	3
				10	26	2	19	2
		Enceladus	15	10	13	261	55	2
28	R	Iapetus ..		9	28	82	51	2
		Titan		9	24	87	29	2
		Rhea		9	14	140	52	3
		Dione ..		9	17	57	56	4
		Tethys ..		9	6	115	29	4
29	R	Titan		9	56	97	0	2
		Rhea		9	51	262	35	2

(403) To render these observations available for the purpose of affording epochs by which to correct the received periodic times, and obtaining a knowledge of the ellipticities of the orbits (so far as they may be adequate to that purpose), it will be necessary to convert the observed angles of position into Saturnicentric longitudes, for which the following formulæ and elements are used, the *de*scending node of the ring being the zero point of longitude.

$$\tan\phi = \sin l \,.\, \tan(\theta - p)\,; \qquad v = \phi + \lambda\,; \quad \text{(A)}$$

The *Berlin Ephemeris* contains the values of p, l, and λ (there called u'), for intervals of forty days, as also of a, the major axis of the ring-ellipse; p representing the angle of position of the northern semi-minor axis of the ring, l the angle of elevation of the earth (northwards) above the plane of the ring, and λ the Saturnicentric longitude of the earth, reckoned in the plane of the ring from the *as*cending node of the ring on the ecliptic. These elements are interpolated (graphically by interpolating curves), for the days of observation, in the following table, where also are added the values of τ, the time occupied by light in its passage from the planet to the earth.

Date.	p	l	λ	a	τ	Date.	p	l	λ	a	τ
	−	+					−	+			
1835	° ′	° ′	° ′	″	m.	1835	° ′	° ′	° ′	″	m.
May 18	2 23	11 20	208 8	42.85	73.2	May 24	2 25	11 13	207 55	42.55	73.7
19	2 23	11 19	208 5	42.80	73.3	25	2 25	11 12	207 52	42.50	73.8
20	2 24	11 18	208 2	42.75	73.4	27	2 26	11 10	207 48	42.40	74.0
23	2 24	11 14	207 56	42.60	73.6	28	2 26	11 9	207 44	42.35	74.1

Date.	p	l	λ	a	τ
	−	+			
	° ′	° ′	° ′	″	m.
May 29	2 26	11 8	207 42	42.30	74.2
31	2 27	11 7	207 38	42.25	74.4
June 1	2 27	11 7	207 37	42.20	74.6
4	2 28	11 5	207 31	41.90	74.9
5	2 28	11 4	207 29	41.85	75.0
6	2 28	11 4	207 27	41.80	75.1
7	2 29	11 3	207 25	41.75	75.2
8	2 29	11 3	207 24	41.70	75.4
9	2 29	11 2	207 23	41.65	75.5
10	2 29	11 2	207 22	41.57	75.6
12	2 29	11 2	207 21	41.44	75.9
15	2 29	11 2	207 18	41.25	76.2
16	2 29	11 2	207 18	41.19	76.4
17	2 29	11 2	207 18	41.22	76.5
18	2 29	11 2	207 17	41.06	76.6
19	2 29	11 3	207 17	41.00	76.8
20	2 30	11 3	207 17	40.92	76.9
21	2 30	11 3	207 17	40.84	77.0
24	2 30	11 4	207 18	40.62	77.5
25	2 30	11 4	207 19	40.55	77.6
27	2 29	11 5	207 21	40.48	77.8
July 13	2 28	11 20	207 41	39.30	79.4
15	2 27	11 23	207 44	39.20	79.7
21	2 25	11 31	208 1	38.80	81.1
1836	−	+			
Jan. 10	0 21	18 4	224 16	38.53	82.0
Feb. 1	0 15	18 17	225 9	39.87	78.9
4	0 14	18 18	225 14	40.00	78.5
5	0 14	18 18	225 15	40.07	78.4
9	0 14	18 17	225 17	40.27	77.8
Mar. 6	0 15	18 4	224 48	42.11	74.8
26	0 24	17 38	223 48	43.03	73.1
April 7	0 31	17 19	223 3	43.37	72.5
14	0 35	17 9	222 34	43.47	72.3
21	0 39	16 58	222 3	43.53	72.2
25	0 41	16 51	221 46	43.52	72.3
26	0 41	16 50	221 43	43.52	72.3
27	0 42	16 48	221 40	43.50	72.3
May 1	0 45	16 43	221 23	43.47	72.4
3	0 46	16 41	221 13	43.43	72.5
12	0 51	16 28	220 37	43.22	72.8
13	0 52	16 27	220 33	43.10	72.8
19	0 54	16 19	220 12	42.97	73.2
22	0 55	16 16	220 1	42.87	73.4
24	0 56	16 14	219 54	42.77	73.6

Date.	p	l	λ	a	τ
	−	+			
	° ′	° ′	° ′	″	m.
June 1	0 58	16 6	219 33	42.43	74.2
3	0 59	16 4	219 28	42.33	74.5
8	1 0	16 0	219 8	41.97	74.9
11	1 1	15 58	219 3	41.83	75.2
27	1 4	15 53	218 45	40.80	77.1
July 12	1 4	15 59	218 46	39.80	79.0
14	1 3	16 1	218 50	39.70	79.4
Aug. 11	0 56	16 37	220 4	37.70	83.1
1837	+	+			
Mar. 12	1 21	21 48	237 6	41.37	76.2
13	1 21	21 47	237 4	41.42	76.1
26	1 17	21 36	236 31	42.08	74.8
28	1 16	21 34	236 24	42.14	74.5
April 1	1 14	21 30	236 12	42.37	74.3
7	1 11	21 24	235 49	42.85	73.9
8	1 11	21 23	235 46	42.63	73.8
9	1 10	21 21	235 43	42.67	73.7
10	1 10	21 20	235 39	42.70	73.7
11	1 9	21 19	235 35	42.72	73.6
12	1 9	21 18	235 30	42.75	73.6
13	1 8	21 16	235 23	42.78	73.5
14	1 8	21 15	235 20	42.80	73.5
15	1 7	21 14	235 17	42.83	73.4
20	1 4	21 9	234 54	42.93	73.2
24	1 2	21 4	234 36	43.01	73.1
27	1 0	21 1	234 24	43.03	73.0
28	0 59	21 0	234 20	43.05	.0
29	0 58	20 59	234 16	43.07	.0
30	0 57	20 58	234 12	43.07	.0
May 1	0 57	20 56	234 6	43.08	.0
3	0 56	20 54	233 58	43.10	.0
4	0 55	20 53	233 53	43.11	.0
5	0 54	20 52	233 48	43.11	.0
6	0 53	20 51	233 44	43.11	.0
7	0 52	20 49	233 39	43.11	.0
8	0 51	20 48	233 30	43.10	.0
9	0 50	20 46	233 26	43.09	73.0
21	0 43	20 33	232 32	42.87	73.3
June 5	0 36	20 19	231 38	42.33	74.2
6	0 35	20 18	231 36	42.28	74.3
24	0 29	20 7	230 40	41.38	76.0
25	0 29	20 7	230 38	41.33	76.1
July 28	0 28	20 21	231 0	39.22	80.3
29	0 29	20 22	231 2	39.11	80.4

(404) The use of these elements supposes the orbits of the satellites coincident with the plane of the ring. They are, therefore, inapplicable to the reduction of the observations of Iapetus, the deviation of whose orbit from that plane is very considerable, and which will require special elements adapted to its own case.

(405) For the other satellites the following tables exhibit the Saturnicentric longitudes, from the descending node of the ring, calculated from these formulæ and elements for each of the times of observation as above stated, and for each satellite drawn out *seriatim*. They are found in the column headed Observed Longitudes : annexed, in the column headed Mean Longitudes, are the mean longitudes (reckoned in the same way on the ring, and from the same node), as calculated from the following assumed epochs of longitude and mean motions.

	Titan.	Rhea.	Dione.	Tethys.	Enceladus.	Mimas.
Epochs.	° ′	° ′	° ′	° ′	° ′	° ′
1835.0	321 58.2	346 33.4	65 54.6	358 16.6	29 26.4	
1836.0	305 9.3	353 14.0	327 40.8	313 43.8	67 36.6	16 34.2
1837.0	265 45.8	280 11.1	97 55.2	78 28.8	203 3.0	
Mean motion in 365 days.	22 Rev. + 320 36.5	80 Rev. + 286 58.2	133 Rev. + 130 14.4	193 Rev. + 124 45.0	266 Rev. + 135 26.4	387 Rev. + 95 58.8

The other column contains the excess of the observed true over the calculated mean longitudes, and exhibits the joint effect of error of observation, equation of the centre, and error of epoch, the mean motions assumed being so nearly correct as to render any small error thence arising of no account. In this table, estimated angles, and those resulting from measurement of diagrams are omitted.

TABLE A. SYNOPSIS OF OBSERVED TRUE AND CALCULATED LONGITUDES OF TITAN.

Date.	Observed Long.		Mean Long.		Difference.	
1835	°	′	°	′	°	′
May 18	203	44	206	35	− 2	51
	205	26	207	54	− 2	28
19	229	19	229	47	− 0	28
20	251	2	249	50	+ 1	12
23	323	57	317	56	+ 6	1
24	341	23	341	5	+ 0	18
25	4	16	3	40	+ 0	36
27	52	52	48	50	+ 4	2
29	96	30	93	23	+ 3	7
31	132	25	137	2	− 4	37
June 1	156	30	160	26	− 3	56
4	229	35	229	46	− 0	11
5	253	24	252	23	+ 1	31
6	279	37	274	7	+ 5	30
7	299	4	294	56	+ 4	8
8	320	10	317	28	+ 2	42
9	344	0	342	7	+ 1	53
10	7	6	4	7	+ 2	59
12	51	33	46	25	+ 5	8
15	122	15	118	0	+ 4	15
16	141	39	140	14	+ 1	25
17	159	16	160	59	− 1	43
18	181	28	184	59	− 3	31
19	203	20	205	51	− 2	31
	207	4	209	14	− 2	10
20	229	11	229	44	− 0	33
21	208	57	251	15	+17	42
25	340	27	340	51	− 0	24
26	7	51	3	14	+ 4	37
27	31	0	27	51	+ 3	9
July 13	31	41	29	55	+ 1	46
15	76	39	71	43	+ 4	56
21	205	16	207	44	− 2	28
1836						
Jan. 10	159	46	161	25	− 1	39
Feb. 1	300	43	298	8	+ 2	35
4	8	16	6	16	+ 2	0
5	29	55	27	35	+ 2	20
9	121	5	119	35	+ 1	30
Mar. 6	349	0	345	46	+ 3	14
27	99	20	97	34	+ 1	46

Date.	Observed Long.		Mean Long.		Difference.	
1835	°	′	°	′	°	′
April 7	348	40	346	16	+ 2	24
14	139	57	142	18	− 2	21
21	306	18	302	9	+ 4	9
25	35	44	32	30	+ 3	14
26	58	31	54	12	+ 4	19
27	82	24	76	39	+ 5	45
May 3	210	43	213	13	− 2	30
8	329	48	322	42	+ 7	6
12	55	45	54	1	+ 1	44
19	208	30	211	27	− 2	57
22	282	2	279	51	+ 2	11
24	330	18	324	47	+ 5	31
June 1	136	22 :	144	57	− 8	33 :
3	183	6 :	191	17	− 8	11 :
8	309	5	304	32	+ 4	33
11	10	29	11	20	− 0	51
27	11	53	9	59	+ 1	54
July 12	345	4	348	22	− 3	18
14	35	41	32	36	+ 3	5
Aug. 11	307	6	304	35	+ 2	31
1837						
Mar. 12	82	11	79	36	+ 2	35
13	105	48	104	14	+ 1	34
26	37	9	35	56	+ 1	13
28	84	39	82	18	+ 2	21
April 1	170	28	172	31	− 2	3
7	312	36	308	2	+ 4	34
8	333	22	328	49	+ 4	33
9	355	47	353	9	+ 2	38
10	17	54	14	10	+ 3	44
11	40	19	38	9	+ 2	10
12	62	45	60	41	+ 2	4
13	84	47	84	10	+ 0	37
14	108	53	105	26	+ 3	27
15	127	11	126	6	+ 1	5
20	239	11	239	48	− 0	37
24	336	59	331	49	+ 5	10
27	41	20	39	5	+ 2	15
28	59	56	60	7	− 0	11
	64	8	61	50	+ 2	18
29	87	40	82	39	+ 5	1

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1837	° ′	° ′	° ′	1837	° ′	° ′	° ′
	85 9	84 26	+ 0 43	May 9	307 55	307 37	+ 0 18
April 30	108 9	104 30	+ 3 39	21	214 53	218 8	− 3 15
May 1	128 46	129 21	− 0 35	June 5	191 34	195 54	− 4 20
3	169 29	173 6	− 3 37	6	214 37	217 49	− 3 12
4	189 21	194 51	− 5 30	24	264 25	264 50	− 0 25
5	215 28	217 56	− 2 28	25	292 21	288 34	+ 3 47
6	239 56	240 33	− 0 37	July 28	312 28	312 26	+ 0 2
7	264 35	262 59	+ 1 36	29	339 12	335 30	+ 3 42

TABLE B. SYNOPSIS OF OBSERVED TRUE AND CALCULATED MEAN LONGITUDES OF RHEA.

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1835	° ′	° ′	° ′	1836	° ′	° ′	° ′
May 19	301 29	297 39	+ 3 50	Aug. 11	147 40	141 19	+ 6 21
23	251 44	249 52	+ 1 52				
24	322 21	331 20	− 8 59	1837			
June 6	289 41	285 48	+ 3 53	Mar. 12	221 19	217 12	+ 4 7
15	284 47	284 0	+ 0 47	13	307 25	303 58	+ 3 27
17	80 1	76 21	+ 3 40	April 1	12 10	15 16	− 3 6
18	157 38	157 55	− 0 17	7	131 42	133 26	− 1 44
19	240 3	241 24	− 1 21	8	208 0	207 15	+ 0 45
20	313 57	319 2	− 5 5	9	291 51	292 36	− 0 45
21	34 44	34 8	+ 0 36	10	6 13	9 48	− 3 35
	39 16	38 4	+ 1 12	11	88 16	91 43	− 3 27
25	348 53	356 38	− 7 45	12	157 33	171 17	−13 44
26	84 20	73 32	+10 58	14	328 11	329 4	− 0 53
27	154 36	157 14	− 2 38	20	68 8 :	83 41	−15 33 :
July 15	150 21	143 46	+ 6 45	27	283 50	285 54	− 2 4
21	260 1	262 17	− 2 16	28	359 16	0 6	− 0 50
					3 56	5 35	− 1 39
1836				29	83 8	80 1	+ 3 7
Feb. 9	274 59	271 17	+ 3 32		87 51	85 20	+ 2 31
April 26	278 1	275 22	+ 2 39	30	162 30	156 20	+ 6 10
27	347 22	353 44	− 6 22	May 4	123 20	115 42	+ 7 38
May 3	114 29	114 48	− 0 19	5	196 34	192 24	+ 4 10
12	101 50	103 7	− 1 17	6	279 48	274 41	+ 5 7
24	339 1	337 20	+ 1 41	7	352 48	357 5	− 4 17
June 1	256 33	253 43	+ 2 50	8	77 26	75 24	+ 2 2
2	329 3	331 5	− 2 2	9	153 46	153 22	+ 0 24
3	53 41	55 4	− 1 23	21	29 33	28 35	+ 0 58
8	101 22	97 51	+ 4 31	June 5	141 21	140 22	+ 0 59
11	321 14 :	333 49	−12 35 :	6	219 0	217 30	+ 1 30
27	143 1	160 1	−17 0	25	297 37	296 30	+ 1 7
July 12	280 5	275 16	+ 4 49	July 28	34 14	41 40	− 7 26
14	69 34	69 38	− 0 4	29	120 11	123 24	− 3 13

TABLE C. SYNOPSIS OF OBSERVED TRUE AND CALCULATED MEAN LONGITUDES OF DIONE.

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1835	° ′	° ′	° ′	1836	° ′	° ′	° ′
May 18	277 39	278 44	− 1 5	June 3	107 18 :	112 58	− 5 40 :
June 21	45 35	44 43	+ 0 52	8	60 22	57 22	+ 3 0
26	338 23	343 26	− 4 53	11	89 29	87 22	+ 2 7
1836				July 12	190 28	188 27	+ 2 1
April 27	297 38	298 47	− 1 9	14	91 11	85 22	+ 5 49
May 12	99 8	101 11	− 2 3	1837			
June 1	209 14 :	207 55	+ 1 19 :	April 7	328 44	328 47	− 0 3

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1837	° ′	° ′	° ′	1837	° ′	° ′	° ′
April 28	201 16	198 58	+ 2 18	May 8	72 32	72 23	+ 0 9
29	330 32	330 13	+ 0 19	9	209 20	211 19	− 1 59
30	105 28	99 17	+ 6 11	June 5	144 48	144 45	+ 0 3
May 4	264 0	266 4	− 2 4	6	271 33	272 21	− 0 12
5	35 56	37 14	− 1 18	25	253 20	256 11	− 2 51
6	172 9	170 31	+ 1 38	July 28	259 36	272 17	−12 41
7	298 10	301 35	− 3 35				

TABLE D. SYNOPSIS OF THE OBSERVED TRUE AND CALCULATED MEAN LONGITUDES OF TETHYS.

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1835	° ′	° ′	° ′	1837	° ′	° ′	° ′
June 21	97 14	88 15	+ 8 59	April 29	173 9	178 24	− 5 15
25	138 42	141 10	− 2 28	30	357 8	4 3	− 6 55
				May 4	43 33	43 0	+ 0 33
1836					49 11	52 49	− 3 38
May 12	357 20	0 59	− 3 39		55 22	56 39	− 1 17
June 1	205 14 :	205 29	− 0 15 :		65 1	63 16	+ 1 45
2	31 38	29 43	+ 1 58	5	227 33	226 26	+ 1 7
3	223 55	225 1	− 1 6		240 41	241 32	− 0 51
	233 56	235 35	− 1 39	6	69 23	71 33	− 2 11
	243 12	248 45	− 5 33	7	261 42	263 35	− 1 53
8	120 1	115 44	+ 4 17	8	98 8	91 54	+ 6 14
11	312 41	320 50	− 8 9	9	292 32	294 59	− 2 37
July 12	93 28	88 45	+ 4 43	June 5	12 48	17 0	− 4 12
14	115 38	101 5	+14 33	6	206 14	202 47	+ 3 27
				25	224 22	228 58	− 4 36
1837					236 55	234 8	+ 2 47
April 7	328 44 :	320 32	+ 8 12 :	July 28	14 18	36 0	−21 42
9	349 49 :	342 46	+ 7 3 :		24 26 :	39 27	−15 1 :
28	339 17	350 21	−11 4				

TABLE E. SYNOPSIS OF THE OBSERVED TRUE AND CALCULATED MEAN LONGITUDES OF ENCELADUS.

Date.	Observed Long.	Mean Long.	Difference.	Date.	Observed Long.	Mean Long.	Difference.
1835	° ′	° ′	° ′	1837	° ′	° ′	°
June 21	297 17	292 58	+ 4 19	May 4	150 25	145 18	+ 5 7
				6	304 22	302 22	+ 2 0
1836					313 56 :	315 29	− 1 33
May 12	284 41	290 47	− 6 6	8	122 24	112 12	+10 12
June 1	127 23 :	134 48	− 7 25 :	9	20 34	30 3	− 9 29
3	295 41 :	314 26	−18 45 :	June 6	157 1	152 15	+ 4 46
				25	116 59	101 0	+15 59

PRESUMED SINGLE OBSERVED TRUE LONGITUDE AND CALCULATED MEAN LONGITUDE OF MIMAS.

1836, June 3; Observed Long. 295° 24′; Mean Long. 295° 24′; Difference = 0.

(406) Whatever errors we attribute to our assumed epochs, and whatever values we assign to the equations of the centres in these series, there will still remain large outstanding differences, which can only arise from error of observation. It must be borne in mind, however, that

any error committed in the measurement of the angle of position at or near the greatest elongations, are violently exaggerated when reduced to longitude, since they become multiplied (as the effect of that reduction) by a factor nearly equal to cosec l, the average values of which, in the respective years 1835, 6, and 7, are 5.13, 3.42, and 2.79. Now, very nearly all the worst cases of apparent discordance fall within a measured angle of 15°, one way or other, of the line of Ansæ, and therefore originate (in so far as they are really erroneous) in errors of measurement very much less than their apparent amount, and which in fact fall within limits even less wide than might be expected under all the circumstances. Some observations, no doubt, ought to be rejected. Such are those of Titan for June 21, 1835, and June 1 and 3, 1836; of Rhea, for June 26, 1835, June 11 and 27, 1836, and April 12 and 20, 1837; of Dione, for July 28, 1837; and of Tethys for the same day. Now there is not one of these whose rejection, on referring to the original observations, is not justified on good and obvious grounds. Thus the observations of June 21 and 26, 1835, and June 11, 1836, were made with the reflector out of the meridian by adjusting the fixed wire as well as might be to the parallel—a proceeding especially open to error, from the mode of suspension of the telescope, and the difficulty of keeping it steady when deprived of the firm support of the side ladder. Those of June 1 and 3, 1836, were altogether irregular and tentative: reference being had, indeed, to the Ansæ, but in the insufficient and unsatisfactory manner alluded to in Art. (399). Again, the equatorial measures of Rhea for June 27, 1836, and April 20, 1837, are merely superficial, hurried and single measures without any weights attached to them; while on April 12, 1837, occur the remarks:—“Definition for the most part dreadfully bad.” And again, “Every possible annoyance from cloud and bad definition.” Lastly, the observations of July 28, 1837, besides the evil of bad definition, which disturbed and prematurely broke off the observations, some other especial cause would appear to have acted to disturb the judgment in respect of all the satellites observed (except Titan), the measures of all being affected with unusually large negative error, and that in the proportion of their proximity to the planet.

(407) In the mode of treatment by graphical projection to which these observations have been subjected, considerations of this kind may in great measure be dispensed with. It is certainly satisfactory to see good reason for rejecting discordant measures; but in such projections bad observations at once proclaim themselves, and drop out of consideration. Each of the foregoing series has been so projected, and the following are the results of the operation:—

Deduced Elements.	Titan.	Rhea.	Dione.	Tethys.	Enceladus.
Excentricity	0.02385	0.02269	0.02066	0.04217 :	
Equation of centre ..	2° 44′	2° 36′	2° 22′	4° 50′ :	
Perisaturnium	270 0	95 0	42 30	53 40 :	
Correction of epochs	+0 30	+0 30	0 0	0 0	+0° 5′
Corrected epochs :—					
1835	322 28.2	347 3.4	65 54.6	358 16.6	29 31.4
1836	305 39.3	353 44.0	327 40.8	313 43.8	67 41.6
1837	266 15.8	280 41.1	97 55.2	78 28.8	203 8.0

(408) Comparing these results in the case of Titan with those of Bessel, we find as near

an agreement as, from the apparently rough data from which we set out, and the brief interval embraced by my observations, could be expected. The excentricity assigned by him as his final result for 1830 (*Astron. Nachr.* 214) is 0.029314, and his perisaturnium for the same epoch 244° 17′ 36″ from his point of departure, which, reduced to the descending node of the ring by adding 12° 20′ 35″, and further corrected by + 3° 13′ 19″, the motion of the perisaturnium for the six years from 1830 to 1836 gives 259° 4′ 30″ in our mode of reckoning: differing by 10° 18′ 30″ from that above concluded—a quantity not large, considering the near approach of the orbit to a circle, and the consequent delicacy of this element. The most important difference is the correction of 0° 30′ in the epochs, which is in effect a deviation to that precise amount from Bessel's: those epochs, and the tables of mean motions given by him in *Astron. Nachr.*, No. 195, having been used in calculating the mean longitudes in Table (A). Though this correction is more considerable than could be wished, I feel disposed, on a mature consideration of the whole series of projected results, to insist on the necessity of *some* correction in this direction, though perhaps not to quite so great an extent.

(409) The excentricities and perisaturnia of Rhea and Dione, especially the latter, are indicated with considerable decision by the projections, and I have no doubt are respectable approximations to the truth. The epochs of both are undoubtedly correct to within a degree, and afford the means of testing, and, if need be, of correcting, their periods and mean motions by comparison with earlier observations. Thus, in the case of Rhea, if we calculate by the tables, epochs, and precepts given in *Phil. Trans.* 1790, p. 488...495, its mean longitude for Aug. 23, 1789, mean noon at Slough (on which day the earth was exactly or very nearly in the plane of the ring*), we find it to have been 36°.64, *as seen from Slough*, the equation of light being neglected in the precept alluded to; and since noon at Slough corresponds to + 1^h 16^m 19^s at Feldhausen, which is partly counteracted by the equation of light — 1^h 10^m at the date in question, if we calculate by the same tables of mean motion, but by *our* epoch for 1836, the mean longitude for 1836, Aug. 23, 0^h 6^m 19^s (tabular date), we get 1°.30 for the actual mean longitude, after a lapse of 17166 exact days. In this interval there must have been described, over and above an integer number of revolutions, a fractional part = 361°.30 — 36°.64 = 324°.66. Now, the mean motion assumed gives for that number of days 3799 revol. + 324°.18, differing only by — 0°.48 from observation, a degree of precision which could by no means have been looked for, and which authorizes our regarding our assumed mean motion of 80 revol. + 286°.97 in 365 days as exceedingly accurate. An error of a whole revolution would entail a deviation of 7°.66 per annum, and would therefore produce on the whole period embraced by my observations a regularly progressive discordance, amounting in the whole to between 16° and 17°.

(410) If we institute a similar calculation for Dione, we find that the mean longitude actually described in our interval of 17166 days is 15°.47 in excess of an integer period; and

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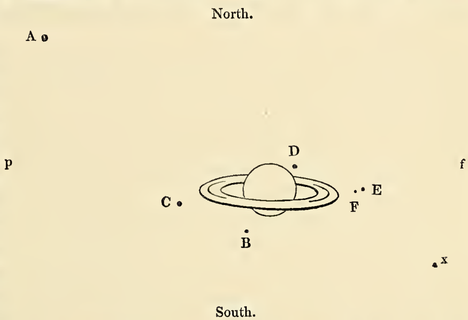
* The mean motions of these tables, for the five older satellites, are Lalande's, from the Connaiss. des Temps, 1791.—The 23rd of August is chosen because, under the circumstances of that date, the precept alluded to in the text is rigorously exact, the reduction of Saturn's geocentric longitude (or rather of the portion of that longitude between Saturn and the node of the ring) to the plane of the ring being then, and then only, negligible.

if we calculate by the tabular mean motion, the mean motion for that interval, we find it to come out 6272 rev. + 8°.16. Here, again, the difference (7°.31) is so small, that we cannot hesitate to accept 6272 as the true number of revolutions; and calculating on this, we obtain for a corrected mean motion, for 1 day, 131°.5353296, and for 365 days, 133 rev. + 130°.3953040.

(411) So, again, for Tethys. The mean longitude really described in the same interval was 49°.30 in excess of a whole number of revolutions, while that calculated from our assumed mean motion is 9093 rev. + 40°.93. The difference, again, is so small a fraction of a circumference, that we are authorized to assume 9093 for the true number, and to assign 190°.6984330 for the corrected mean motion in 1 day, and 193 rev. + 124°.9280450 in 365.

(412) With Enceladus the discordance is greater; the observed motion being 337°.32 in excess of whole revolutions, and the calculated being 12527 rev. + 255°.68. The difference is 81°.64, which, being still less than a quadrant, would appear to authorize our assuming 12527 as the true number of revolutions, since the assumption of the nearest less integer would produce the intolerable error of nearly 6° per annum. Taking, therefore, 12527 as the true number, we get 262°.7319889 and 266 rev. + 137°.1759485 for the mean motions in 1 and 365 days respectively.

(413) From the single observation of Mimas (if really such) of course nothing can be concluded. It is necessary to state the circumstances of this observation. On the 3rd of June, 1836, at $9^h\ 38^m$ M. T., the satellites A (Titan), B (Rhea), C (Dione), D (Tethys), were seen, and a diagram made of them as here represented. Jupiter, though of course visible, was not noted, being much more distant in the direction nearly of A, as appears by referring to its table of observed angles of position.* At $9^h\ 50^m$ the following memorandum occurs:—"I now see another satellite, E" (this was Enceladus). "Showed ——— the above. She could not see E." (The party here referred to is very short-sighted.) "As she was going, looking again, I now see that E is double, and F by glimpses very discernible." At $10^h\ 25^m$ it is remarked, "The line E F is more oblique, and points very nearly towards B." After taking several measures, among which is that of Enceladus at $11^h\ 0^m$, recorded in the synoptic table (p. 419), and which is characterized as "a satisfactory measure, steadily contemplated in an interval of unexampled tranquillity," the following remarks occur: "$11^h\ 6^m$ M. T. Planet getting low, and frequent intervals of confusion coming on. Of the existence of E there can be no doubt; but when I got my best



* There is in the original diagram a small star marked y beyond A, but not far enough for the satellite in question. Its situation, however, is correct as regards position, and it may have been the satellite misplaced in distance to keep the figure within bounds. A in the figure is represented too distant.

views of E, I did not see F; and though I have no doubt F was a real object, I could not see it again after the planet began to grow furry. Tried the field bar, but it proved of no service." It is to be remarked, that during the 35 minutes between the two recorded notices of F, the planet had moved $3''.8$ westward, and $1''.05$ northward, which would be nearly counteracted by the apparent southward motion of E; so that, had F been a star, the objects would have been brought into conjunction, instead of remaining, as they appeared to do, nearly at the same mutual distance. Should it be contended, from the invisibility of F at $11^h\ 0^m$, when E *was best seen*, that such was really the case, and that it was *then* actually covered by Enceladus, I can only remark on the improbability of such an occultation; which yet certainly *may* have happened. If so, I have been defeated in every attempt to observe this satellite. Mr. Lassel has been more fortunate, having, as he informs me, obtained three sure observations of it, on Aug. 25, 30, and Sept. 1, 1846, with his large equatorial reflector, power 567.

(414) For the determination of the mean distances or major semiaxes of the orbits, measures at or near the greatest elongation of the satellites can alone be advantageously employed, especially in considerable obliquities of the ring where the foreshortening of the radius vector renders every error committed unduly influential. In the course of the observations in which the foregoing positions were accumulated, a good many measures of distance were also taken in all angles of position, and all taken from the apparent centre of the planet for the sake of uniformity of calculation. On reducing them, however, I find that even at moderate inclinations to the line of Ansæ, not only do the discordances between individual results increase rapidly (as might be expected), but that a general cause appears to have acted, rendering the results progressively more and more erroneous in defect of the truth with the increase of inclination. This cause can be no other than the want of symmetry of the upper and lower portions of the outline of the visible part of the body—the one circular and protuberant, projecting upon and beyond the ring and uninterrupted—the other cut across by the ring, and thereby deprived of its due influence on the judgment. This, of course, makes the apparent centre more difficult to fix upon, and is therefore far more influential here than in measures of position where general symmetry alone is aimed at, and the imagination has only to fill up the circular outline, not at the same time to decide upon its centre. In situations very near the line of Ansæ, this disturbing influence does not act; the diameter of the planet presenting itself unbroken and similarly terminated at both extremities as a line for bisection. I shall, therefore, set down only those measures of distance which have been procured at apparent inclinations to the line of Ansæ within 10° one way or other (a situation, however, it must be recollected, still unfavourable for exactness without the advantage of a clock-work movement). For Titan these distances are as follows:—

Date.		$\theta + p - 90°$	ρ	r		Date.		$\theta + p - 90°$	ρ	r	
1835		° ′	Pts.	″		1835		° ′	Pts.	″	
May 23	f	+5 28	695.30	167.75	m	June 7	f	+0 12	737.10	170.29	m
29	p	−4 9	711.90	176.65	m	8	f	+4 36	673.90	166.15	m
31	p	+3 9	736.80	178.65	m	15	p	+0 57	779.50	182.25	m, Δ
June 1	p	+9 50	589.00	182.17	m	16	p	+4 57	706.70	179.75	m
6	f	−3 32	684.10	170.43	m						

Date.		$\theta + p - 90°$	ρ	r		Date.		$\theta + p - 90°$	ρ	r	
1835		° ′	Pts.	″		1836		° ′	Pts.	″	
June 17	p	+9 46	577.90	186.54	m	May 24	f	+5 56	725.80	169.42	m
						Aug. 11	f	−0 51	676.70	173.65	Δ
1836											
Jan. 10	p	+8 25	656.60	183.17	m	1837					
Feb. 1	f	−4 37	695.20	174.41	m	Apr. 7	f	−4 54	771.20	181.30	Δ
9	p	−4 39	745.50	184.13	m	8	f	+2 47	791.44	179.33	Δ
Apr. 14	p	+2 11	821.00	184.71	Δ	15	p	−6 45	763.53	179.26	Δ
21	f	−1 51	804.30	180.32	Δ	24	f	+4 31	787.22	178.01	Δ
May 22	f	−8 28	670.00	171.04	m	May 1	p	−5 37	761.10	178.54	Δ

The letters p and f in the second column of this table indicate whether the measures were taken at the preceding or following elongation, and m and Δ in the last whether between the wires or by differences of right ascension (duly reduced), both expressed in micrometer parts in the column headed ρ. The angles set down under the heading $\theta + p - 90°$ are the apparent inclinations of ρ to the line of Ansæ. Lastly, under the heading r are stated the elliptic values of the radius vector calculated from ρ by the formulæ.

$$\cos \psi = \cos l \,.\, \cos (v - \lambda) \,; \quad \ldots\ldots \quad r = [0.98410] \,.\, \frac{\rho}{a} \operatorname{cosec} \psi$$

where v is the *calculated* mean longitude for the moment of observation (which is sufficiently approximate for the purpose), and $a, l,$ and λ are given by the table in Art. 403. The numerical quantity 0.98410 is the logarithm of 40″.095, the mean value of a multiplied by 0.24044, the reducing factor of the micrometer parts for conversion into seconds. The auxiliary angle ψ represents the angular saturnicentric elongation of the satellite from the earth.

(415) To obtain from these elliptic distances the mean distance or semiaxis of the orbit, we must consider that in an ellipse whose excentricity is $A\, e$ (the semiaxis being A), the greatest possible difference between two *chords* passing through the focus is $2\, A\, e^2$; and, consequently, that the semi-sum of any two opposite radii vectores cannot differ from the major semiaxis by more than $A\, e^2$, which in the present case hardly exceeds 0″.1. In the actual state of the data, owing to the situation of the perisaturnium, whose average distance in longitude from the Ansa during the period embraced by the observations is about 52° (using Bessel's place), it is still less. Taking, therefore, the means of the results for the preceding and following Ansæ respectively, which we will call r and r', we get $r = 181.44$ (eleven observations), and $r' = 173.51$ (twelve observations), from which we obtain—

$$A = \frac{r + r'}{2} \left\{ 1 + e^2. \left(\sin 52°\right)^2 \right\} = 177''.53$$

(416) I have no confidence in any of the distances of Rhea measured with the equatorial micrometer, the faintness of the object not permitting it to be satisfactorily covered with the wire, while the attention was necessarily divided between it and the apparent centre of the planet. On reducing those which have been procured, I find them so far from satisfactory that it is needless to state them, inasmuch as they give for their ultimate result a mean distance of 73″.86,

being $2\frac{1}{2}''$ less than would be consistent with Kepler's law, and are otherwise very discordant both with each other and with the ellipticity and situation of the orbit as above determined. Those of Iapetus, though not numerous, and for the most part taken merely for the purpose of identifying the satellite and distinguishing it from a star, presented less difficulty; for which reason, and because they may not prove altogether valueless, they are here set down, distinguishing by m measures taken between the wires, by Δ those calculated from differences of R A, and by δ those obtained by oblique transits, and also annexing the number of individual measurements on which each relies.

Time of Obs.		Dist.		Time of Obs.		Dist.		Time of Obs.		Dist.	
1835	h. m.	"		1836	h. m.	"		1837	h. m.	"	
May 18	10 55	315.02	1 Δ	April 27	12 30	255.54	2 Δ	April 12	14 20	522.15	5 Δ
23	9 47	494.83	1 Δ	May 3	13 15	142.22	3 m	15	12 45	497.69	3 Δ
June 15	10 11	148.95	3 Δ	19	10 4	546.89	3 Δ	24	14 28	228.73	4 δ
18	7 15	120.48	1 m	22	11 0	553.93	2 Δ	May 1	14 7	197.40	5 δ
July 21	7 11	254.92	6 Δ	24	10 40	549.22	2 Δ	7	12 5	370.45	1 Δ

The observed greatest elongation, for such it appears by a projection of all the angles and distances to have really been, of May 22, 1836, of 553″.93, if reduced to the mean distance of Saturn, corresponds to a radius vector of 8′ 38.″07, which (considering that we have no knowledge of the excentricity of the orbit) agrees sufficiently well with the mean elongation (8′ 34″.8) calculated from the distance of Titan, by comparison of their mean motions. In this table two very rude measurements under most unfavourable circumstances, on April 25 and 26, 1836, have been rejected; and that of May 7, 1837, ought probably to be so, being the result of a single difference of R A awkwardly taken with the 20-feet.

CHAPTER VII.

OBSERVATIONS OF THE SOLAR SPOTS.

(417) At the latter end of 1836, and during the first half of 1837, the spots on the surface of the sun were extremely remarkable, not only for number and size, but also in their arrangement and forms. In consequence, during the interval above mentioned, a great number of drawings were made of the sun's disc, by projecting the image formed in the focus of an achromatic finder attached to the equatorial, for which, after a few trials, a perspective day telescope of twenty inches focus, and 1.4 in. aperture, was substituted as more convenient. The image was received on paper pinned on a screen of wood, and traced with pencil with one hand, the other managing the right ascension handle so as to keep the preceding limb of the sun on a fiducial line, previously drawn on the paper, and the centre of some small and well defined spot on a fiducial dot. Where the right ascension motion was allowed to rest, the image of this spot of course travelled away from the dot, and after allowing it to do so till near the edge of the paper, another dot was made, marking its new place, and these two dots being joined by a straight line, gave the direction of the diurnal parallel on the paper. The minuter details necessary to effect a complete resemblance of the projection to the actual appearance of the spots, with their penumbras, &c., were then worked in with the aid of the telescope, by hand, as an eye-draft; as well as magnified representations of remarkable spots, faculæ, and other particulars.

(418) I consider it unnecessary here to engrave and publish all these drawings, which would entail a great additional cost and bulk on the present volume; but in case it should ever be considered necessary to appeal to any of them as records of the state of the sun's surface at that time, I annex a list of the days on which such drawings were made as are now before me. These are as follows:

1836—Dec. 27, 31.

1837—Jan. 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 23, 29; Feb. 1, 2, 3, 5, 6, 7, 9, 10, 12, 13, 15, 20, 21, 22, 23, 24, 26, 27, 28; March 1, 3, 4, 6, 10, 12, 13, 14, 18, 19, 21, 22, 26, 27, 29, 31; April 2, 3, 8, 10, 11, 13, 19, 21, 25, 29; May 5, 7, 9, 20, 21, 24, 25, 29; June 8, 18, 25; July 10, 12, 13, 14, 17, 19, 20, 25, 26, 28, 29; August 4, 7; October 9, 10, 11, 17, 18, 24.

It were much to be wished that all who habitually make similar projections, would, in like manner, place at least on record, the days on which they possess drawings of the spots, in order that it may be rendered *possible* (by taking a certain moderate amount of trouble) to ascertain the state of the sun by actual observation on any given day. In all probability, such drawings

exist, scattered throughout the world, if not for every day of every year for some years past, yet, for a much greater number of days than in any single accessible collection; and next to bringing them together, and forming a complete history of the changes of the solar surface, the course recommended appears the most advantageous.

(419) In the delineation of very remarkable spots, a magnified image, accompanied and crossed by the black images of the threads of the micrometer (adjusted to zero of position, and opened to five revolutions of the screw, or 2′ 0″.22), was formed on a screen, at a convenient distance from the eye-piece of the 7-feet achromatic, and brought to sharp definition by properly adjusting the moveable lens of the eye-piece. Thus, the form of the spot, its dimensions, and true situation as respects the parallel were secured, and its delineation was then completed by eye-draft, under a magnifying power of 105 or 179, as the state of the atmosphere would allow. Several of these delineations are presented in Plate XVII., their dates being as follows:—

Jan. 18 .. fig. 13	Feb. 20 . fig. 2	Mar. 29 .. fig. 3	July 26 .. fig. 6.
Jan. 29 .. fig. 10	Feb. 28 .. fig. 11	May 25 .. fig. 9	July 28 .. fig. 5.
Feb. 5 .. fig. 12	Mar. 19 .. fig. 8	July 19 .. fig. 4	July 29 .. fig. 7.
Feb. 9 .. fig. 1			

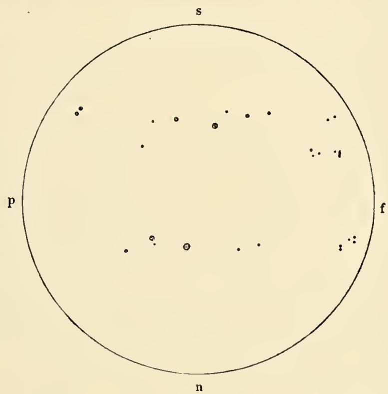
(420) These figures are not all on the same scale. Not having been so drawn originally (which might have been done, but would have required a special apparatus), it was thought better not to risk their correctness in copying by any subsequent alteration. The scale of each figure, however, is sufficiently indicated by the distance of the parallel lines representing the micrometer threads crossing it, which in all alike is 2′. As these drawings sufficiently express the objects they are intended to represent, I shall only draw attention, 1st, to the forms of those in figs. 8 and 10, as highly characteristic, and frequently reproduced on the sun's surface (as it was in perfection on the 25th of May, in the same year); 2ndly, to the remarkable radiated or striated apparent structure of the penumbra in that of fig. 9, an appearance which occurs in many of M. Pastorff's engravings, and which is obviously connected very intimately with the physical cause of the spots; 3dly, to the total absence of all penumbra in the spots adjacent to the large one in fig. 12; 4thly, to the occurrence of distinct shades in certain parts of the penumbræ in figures 1, 5, 7, 12, and, lastly, to the immense area occupied by some of the spots with their penumbræ here represented. That of March 29, for instance, in fig. 3, occupies (without the outlying spots at the tail of the figure), an area (such as may fairly be included within the general outline), of nearly five square minutes. Now a minute in linear dimension on the sun being 27,500 miles, and a square minute 756,000,000, we have here an area of 3,780,000,000 square miles included in one vast region of disturbance, and this requires to be increased for the effect of foreshortening. The black centre of the spot of May 25 (fig. 9), would have allowed the globe of the earth to drop through it, leaving a thousand miles clear of contact on all sides of that tremendous gulph.

(421) We are naturally led to inquire for an efficient cause—for a *vis motrix*—to give rise to such enormous dynamical phenomena, for such they undoubtedly are. The efficient cause of fluctuations in our atmosphere, in terrestrial meteorology, is apparent enough; viz., external agency—the heating power of the sun. Without this, all would be tranquil enough. But in the solar meteorology we have no such extraneous source of alternate elevations and depressions

of temperature altering the specific gravity and disturbing the equilibrium of its atmospheric strata. The cause of such movements as we observe, and upon so immense a scale, must therefore reside within the sun itself, and it is there we must seek it.

(422) Now, whatever be the physical cause of the spots, one thing is certain, that they have an intimate connection with the rotation of the sun upon its axis. The absence of spots in the polar regions of the sun, and their confinement to two zones extending to about 35° latitude on either side, with an intermediate equatorial belt much more rarely visited by spots, is a fact notorious in their history, and which at once refers their cause to fluid circulations, modified, if not produced, by that rotation, by reasoning of the very same kind whereby we connect our own system of trade and anti-trade winds with the earth's rotation. Having given any exciting cause for the circulation of atmospheric fluids from the poles to the equator, and back again, or *vice versa*, the effect of rotation will necessarily be to modify those currents as our trade winds and monsoons are modified, and to dispose all their meteorological phenomena on a great scale which accompany them as their visible manifestations, in zones parallel to the equator, with a calm equatorial zone interposed. It only remains, therefore, to inquire, Whether any such cause of circulation can be found in the economy of the sun, so far as we know and can understand it?"

(423) Before attempting any reply to this question, I would observe that the fact above mentioned — the distribution of the spots in two moderately broad zones parallel to the equator, leaving the equator itself and the poles free—was most unequivocally and beautifully marked during a great part of the interval embraced by my observations. In the last days of December 1836, indeed, and throughout January 1837, as also from the 21st to the 26th of February, both inclusive, even the most unpractised eye could not fail to perceive by the mere allineation of the spots, the situation of the poles and equator of the sun, without watching from day to day their progress across the disc. See marginal fig. which represents their arrangement on Jan. 10, 1837.



(424) Recurring now to the question whether any probable or possible cause can be assigned, from what we *know* of the sun's economy, capable of giving rise to circulatory movements to and from its poles, in the fluids which cover its surface, and having at the same time a dependency on its rotation; it may be observed that if any physical difference in the constitution or circumstances of its polar and equatorial regions tend to repress the *escape* of heat in the one, and to favour it in the other of these regions, the effect will be the same as if those regions were unequally heated from without, and all the phenomena of trade winds, *mutatis mutandis*, must arise.

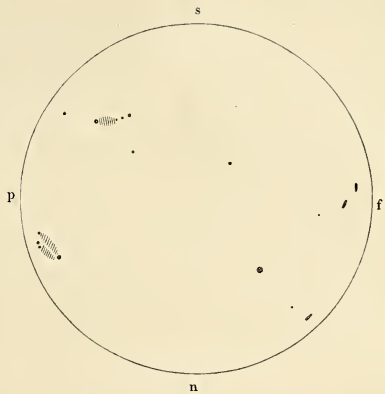
(425) It has been a matter of doubt among astronomers, whether the sun be or be not surrounded by a transparent atmosphere extending beyond its luminous surface. Numerous

observations made under the most favourable circumstances while employed in these delineations have appeared to myself quite conclusive as to its reality. The deficiency of light at the borders of the visible disc is in fact so striking, whether viewed through coloured glasses or without their intervention, by projecting its image through a good achromatic telescope on white paper, that it seems surprising it should ever have been controverted. The extraordinary phenomenon of the rose-coloured solar clouds witnessed during the total eclipse of July 8, 1842, which must have floated in and been sustained by an exterior transparent atmosphere, must also be regarded as definitively settling this question in the affirmative. To what distance beyond the visible disc this atmosphere may extend, we have no means of judging accurately; but, from the manner in which the deficiency of light alluded to comes on, being by no means sudden on approaching the edge, but extending to some distance within the disc, it would seem to be considerable, not merely in absolute measure, *but as an aliquot part of the sun's radius.* Now, granting the existence of such an atmosphere, its form in obedience to the laws of equilibrium must be that of an oblate spheroid, the ellipticities of whose strata differ from each other and from that of the nucleus. Consequently, the equatorial portions of this envelope must be of a thickness different from that of the polar, *density for density*, so that a different obstacle must be thereby opposed to the escape of heat from the equatorial and the polar regions of the sun. The former, therefore, ought, according to this reasoning, to be habitually maintained at a different temperature from the latter.

(426) The spots in this view of the subject would come to be assimilated to those regions on the earth's surface in which, for the moment, hurricanes and tornadoes prevail—the upper stratum being temporarily carried downwards, displacing by its impetus the two strata of luminous matter beneath (which may be conceived as forming an habitually tranquil limit between the opposite upper and under currents), the upper of course to a greater extent than the lower, and thus wholly or partially denuding the opaque surface of the sun below. Such processes cannot be unaccompanied with vorticose motions, which, left to themselves, die away by degrees and dissipate, with this peculiarity, that their lower portions come to rest more speedily than their upper, by reason of the greater resistance below, as well as the remoteness from the point of action, which lies in a higher region, so that their centre (as seen in our water-spouts which are nothing but small tornadoes) appears to retreat upwards. Now this agrees perfectly with what is observed during the obliteration of the solar spots, which appear as if filled in by the collapse of their sides, the penumbra closing in upon the spot and disappearing after it.

(427) An appearance frequently noticed in the course of these observations, but which I do not know to be of general occurrence, may seem at first sight to militate against this idea. Lines of spots of more or less extent, or connected with penumbral trains more or less beset with spots, have been frequently noticed (as in the annexed figure, which represents the appearance in question on Feb. 12, 1837,) oblique to the direction of parallels of latitude on the sun's surface, and converging on both sides of the equator towards the *preceding* side of the disc. Again, instances have occurred within the same period, frequent enough to be remarked, of the penumbræ of great spots in what may be considered a tumultuary state of the atmosphere, being rounded and well terminated on the preceding side, but ragged and ill-defined, as well as more extensively effused on the following, where they would often take the form of great trains, and ultimately in the progress of their changes, before they become obliterated, affect the form of

pretty long, straight, parallel bands, having the same obliquity to the sun's equator and its parallels as the lines of spots above mentioned. The great spot of March 29 (fig. 3), affords a tolerable example of this, though less strongly marked than in some other instances. Now, the direction of such bands and lines is transverse to the course of the currents which the dynamical theory above suggested supposes. They must, therefore, be assimilated rather to ripple marks which are transverse to the direction of the general movement to which they owe their origin, than to trails drawn out by a current in its own direction, if indeed the appearances in question be anything more than accidental.



(428) It may, perhaps, be allowed me here to remark on a character of the solar spots in general, which, though so universal and so striking as to be perfectly familiar to every observer, and to form in fact an essential and integrant part of their phenomena, has not yet, nevertheless, so far as I am aware, had drawn from it exactly that conclusion which seems to me inevitably to follow from it. I allude to the definite and intense blackness of the *spot* "*nucleus*" or "*opening*," as it has been termed, as contrasted with the *Penumbra* or "*Shallow*" surrounding it.* This want of graduation—this sharply marked suddenness of transition, is altogether opposed to the conception of a susceptibility of indefinite and easy mixture in the luminous, non-luminous, and semi-luminous constituents of the solar envelope. Were they so susceptible there seems no reason why spots should not be seen of every possible shade of darkness, from a barely perceptible deficiency of light to absolute blackness, or why one stage of mixture should be more habitually prevalent than another. It is true we see bridges of light, as it were, across the spots, and these may sometimes, though very rarely, form so fine a net-work as here and there to give the appearance of a partial illumination, and on very rare occasions the spots have been described as nebulous or hazy.† But, looking to the broad fact—the spots are black—the penumbra a nearly uniform half shadow, with, however, here and there, undeniable definite spaces of a second depth

* The great importance of a systematic and continuous series of observations of the solar spots cannot be too strongly insisted on. One observer, though gifted with the diligence and perseverance of a Pastorff, is not enough. Many are necessary—and especially in habitually sunny regions of the globe—to secure an *unbroken* history of their appearances. And now that clock-movements have been applied to our equatorials, and that photographic delineation can supply, in the utmost perfection, the talent of the draftsman, it were much to be wished that the subject were seriously taken up as part of the regular business of observatories. An interchange of copies might perhaps take place, without recourse to the engraver, by the aid of *the Kalotype* process of Mr. Talbot, to any moderate and useful extent.

† See Phil. Tr. 1795, p. 57.—But as on this occasion *all* the spots, indiscriminately, are declared to be so affected, there is room to apprehend some instrumental or atmospheric cause of illusion to have prevailed.

of shade, as shown in some of the figures annexed. There is no gradual melting of the one shade into the other—spot into penumbra—penumbra into full light. The idea conveyed is more that of the successive withdrawal of veils—the partial removal of definite films, than the melting away of a mist, or the mutual dilution of gaseous media. Films of immiscible liquids having a certain cohesion, floating on a dark or transparent ocean and liable to temporary removal by winds, would rather seem suggested by the general tenor of the appearances, though they are far from being wholly explicable by this conception, at least if any considerable degree of transparency be allowed to the luminous matter.

(429) In delineating the spots here figured, the 7-feet achromatic only was used; and although, generally speaking, the definition of the sun with this instrument is much inferior to that afforded by a Newtonian reflector of equal focus and 6 inches aperture, yet, on many occasions, the distinctness of vision obtained, under what might, *à priori*, be considered very unfavourable circumstances, has been not a little remarkable. Looking northward, over a burning tract of many miles in extent (often heated to 140° or 150° Fahr.), and on some occasions with a hot wind from the north-west of extreme aridity, a tranquillity and perfection of vision was experienced which was never, or very rarely indeed, obtained *at night* at the same altitude in that direction (as has been already remarked on the occasion of the observations of γ Virginis).

(430) The combination of coloured glasses employed in these delineations was a triple one, consisting of two green glasses, between which a blue one coloured by cobalt is interposed. This I can recommend as by far the most agreeable of any which I have tried for long-continued inspection of the sun. Occasionally (but not for purposes of delineation) I may mention having at various times employed with a 6-inch Newtonian reflector, in place of the ordinary small metallic speculum, one of plate glass, with good effect. A 6-inch glass speculum (the same mentioned in Phil. Trans., 1803, p. 214) has proved less advantageous than I should have, *à priori*, expected, the cause of which, however, would appear to arise from the circumstance of *its posterior surface being roughened and blackened* to take off any disturbing reflexion. In consequence, a great distortion of figure arises, owing to that surface becoming speedily and strongly heated. This inconvenience might doubtless be entirely done away with, by grinding and polishing that, as well as the anterior surface, to a *concave* spherical curve of a considerably smaller radius of curvature than the focal length of the effective reflecting surface. In this arrangement about 95 per cent. of the light would be freely transmitted (and ought not to be stopped by any back to the speculum or even to the tube of the telescope, but permitted to escape into the air). As regards the portion (about $2\frac{1}{2}$ per cent. of the incident beam) reflected from the posterior surface, being incident on a *convex internal* surface of considerable curvature, these rays would be dispersed and so enfeebled as to have no material influence on the distinctness of the image formed in the focus of the first surface, a result greatly favoured by *both* the refractions at that surface which they have to undergo, as a very little consideration of the course of the rays suffices to show. The image formed by the first surface, being received by a small plane glass reflector, will (if the reflexion from the second surface of that mirror be also got rid of*) be

* To do this, the small mirror should by no means be roughened or blackened at the back. It should be in fact a prism of crown glass with a refracting angle of at least 28° 8′, the edge being towards the eye— and *set transparent* (*i. e.* without a metal back to arrest the transmitted light). In this arrangement, no ray but those

finally reduced before reaching the eye-glass to little more than $\frac{1}{900}$th part of their original intensity,* and will therefore require no darkening glass, or but a very slightly tinted one; and all danger of its cracking will be completely obviated. This arrangement I have not had an opportunity to put to the test of experience, but it appears very well worthy of trial.

(431) During the months embraced by these observations, the state of the sun seemed evidently undergoing a gradual alteration, in the nature of a subsidence from violent agitation to comparative tranquillity. Although rich in spots during the whole of January, it was only from the 23rd of that month to the end of March, that these large effused spots of complex structure and great penumbral trains (specimens of which are figured in figs. 1, 2, 3, 8, 10, 11, 12) continued to be formed in copious succession. From that date forward, the character, as well as the abundance of spots, was greatly changed. During April and May, rounded and well-defined forms were chiefly affected, one spot only of the very peculiar character of fig. 10 being exhibited (May 5-7), which, however, broke up into round spots without any great penumbral effusion; and one considerable group from the 19th to the 25th of April, which may be considered as belonging to and terminating the series of "confluent spots," as those in question may be termed. During April and May, the spots were also fewer in number. In June and July they became again more abundant; but the character they then affected was rounded and compact, without any tendency to those broadly effused irregular penumbræ which formed so very remarkable a feature in February and March; while in August and October, so far as observed, the sun seemed to have passed into a quiescent state, the spots being few, small, and irregularly disposed.

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regularly reflected from its first surface at 45° going to form the useful image, could find its way to the eye-piece, all other would pass out into the air at the mouth of the tube, or be returned to the sun by re-reflection at the great speculum, &c. No care need be bestowed on *figuring* the posterior surfaces of either speculum. It suffices that both be well polished.

* Adopting Bouguer's estimates of the light reflected from glass at different incidences.—*Traité d'Optique*, page 137.

APPENDIX.

APPENDIX A.

On the Numerical Magnitudes of certain Stars, as obtained by subsequent Observation on the principle of Sequences, in the Northern Hemisphere, compared and combined with those of the same Stars as observed in the Southern; and of some others whose Places in the scale of Magnitudes are directly deducible from these by interpolation of the Sequences.

(432) Circumstances rendering it highly improbable that the series of northern sequences alluded to in Art. 255 will be further prosecuted (at least by myself), I have thought it advisable here to annex so much of the results of those observations as shall serve for an effectual basis of connexion between the northern and southern numerical nomenclature, and at the same time afford more dependable values to several stars which are very imperfectly determined in our Synoptic Table C, p. 341, being there concluded from single observations, or in that imperfect manner which is indicated by the annexation of one or two asterisks (see Art. 254). The following list of 139 stars above the 4th magnitude is arranged in order of apparent magnitude, solely by the result of the northern sequences in question. The first column contains the name of the star; the second, its magnitude in the Astronomical Society's Catalogue; the third, its magnitude in our Synoptic Table C, derived from the southern sequences; the fourth, the result of a graphical interpolation conducted on a principle explained below; and the fifth, the magnitude finally to be adopted, *in preference to and exclusion of any magnitude previously assigned to the same star in any of the previous sequences and lists in this work*, where they differ. Notes of interrogation (?) annexed to the numbers in column 3, indicate that the stars in question belong to the imperfectly determined ones in Table C, as above alluded to.

Star's Name.	Mag. A S C.	Mag. Table C.	Interp. Mag.	Adopted Mag.
Sirius				
Arcturus				
Capella				
α Orionis (max)				
Rigel				
Lyra				
Procyon				
Aldebaran				
Antares				
α Aquilæ				
Spica				
Pollux				
Fomalhaut				
Regulus				
α Cygni	1.0	1.95 ?	1.90	1.90
Castor	3.0	1.99	1.94	1.94
α Ursæ (var.)	1.5	1.94	1.98	1.96
ε Ursæ (var.)	3.0	1.88	2.02	1.95
α Persei	2.5		2.07	2.07
ε Orionis	2.5	1.84	2.10	1.97
ζ Orionis	3.0	2.01	2.14	2.07
η Ursæ (var. ?)	2.5	2.13 ?	2.18	2.18
β Tauri	2.0	2.34	2.22	2.28
γ Orionis	2.0	2.10	2.26	2.18
β Ursæ Minoris (var.)	3.0	2.46	2.28	2.28
α Polaris	2.5	2.59 ?	2.30	2.30
γ Leonis	2.0	2.34	2.34	2.34
ζ Ursæ	3.0	2.50	2.37	2.43
α Hydræ	4.0	2.30	2.41	2.30
α Arietis	3.0	2.40	2.43	2.40
β Andromedæ	2.0	....	2.45	2.45
β Aurigæ	2.0	2.51 ?	2.48	2.48
γ Andromedæ	3.5	....	2.50	2.50
γ Cassiopeiæ	3.0	....	2.52	2.52
α Andromedæ	1.0	2.25 ?	2.54	2.54
α Cassiopeiæ	3.0	....	2.57	2.57
γ Geminorum	3.0	2.51	2.59	2.59
β Leonis	2.5	2.63	2.61	2.63
Algol (max.)	2.5	....	2.62	2.62
γ Draconis	2.0	....	2.62	2.62
α Ophiuchi	2.0	2.67 ?	2.63	2.63
β Cassiopeiæ	2.5	....	2.63	2.63
γ Cygni	3.0	....	2.63	2.63
β Canis	2.5	2.58	2.63	2.58
κ Orionis	3.0	2.59	2.64	2.59
α Ceti	2.5	3.14 ?	2.64	2.82
α Pegasi	2.0	2.65 ?	2.65	2.65
β Pegasi	2.0	2.78 ?	2.65	2.65
δ Orionis	2.0	2.61	2.66	2.61
ε Pegasi	2.5	2.56	2.67	2.62
α Coronæ	2.0	2.63 ?	2.69	2.69
γ Ursæ	2.0	2.71	2.71	2.71
β Ursæ	2.0	2.77	2.76	2.77
δ Scorpii	3.0	2.86	2.78	2.86
ε Bootis	3.0	2.71	2.80	2.80
σ Sagittarii	3.0	2.41	2.84	2.41
ε Cygni	3.0	....	2.88	2.88
α Cephei	3.0	....	2.90	2.90
α Serpentis	2.5	3.14 ?	2.92	2.92
δ Leonis	3.0	2.92	2.94	2.94
η Bootis	3.0	3.06	2.96	3.01
γ Aquilæ	3.0	3.07 ?	2.98	2.98
δ Cassiopeiæ	3.0	....	2.99	2.99
δ Ophiuchi	3.0	3.00 ?	3.00	3.00
η Draconis	3.0	....	3.02	3.02
η Ophiuchi	2.5	2.89 ?	3.04	3.04
β Draconis	2.0	....	3.06	3.06
β Arietis	3.0	3.49 ?	3.09	3.09
γ Pegasi	2.5	3.05 ?	3.11	3.11

Star's Name.	Mag. A S C.	Mag. Table C.	Interp. Mag.	Adopted Mag.
γ Corvi	3.0	2.90	3.13	2.90
β Corvi	2.5	2.95	3.15	2.95
θ Aurigæ	4.0	....	3.17	3.17
β Herculis	2.5	3.02	3.18	3.18
γ Virginis	4.0	3.08	3.20	3.14
ζ Ophiuchi	3.5	2.97 ?	3.21	3.21
α Cor Caroli	2.5	3.22	3.22	3.22
β Ophiuchi	3.0	....	3.23	3.23
δ Cygni	3.5	....	3.24	3.24
δ Capricorni	3.5	3.20 ?	3.25	3.25
ε Persei	3.5	....	3.26	3.26
ζ Persei	3.5	....	3.27	3.27
ζ Herculis	3.0	....	3.28	3.28
ι Aurigæ	4.0	....	3.29	3.29
γ Ursæ Minoris	3.5	....	3.30	3.30
η Pegasi	3.0	....	3.31	3.31
ζ Aquilæ	3.0	3.45 ?	3.32	3.32
β Cygni	3.0	....	3.33	3.33
γ Persei	4.0	....	3.34	3.34
β Trianguli	4.0	....	3.35	3.35
δ Persei	3.5	....	3.36	3.36
α Aquarii	3.0	2.97 ?	3.37	3.2 ?
β Aquarii	3.0	2.85 ?	3.38	3.2 ?
δ Aquarii	3.0	3.80	3.39	3.60
ζ Draconis	3.0	....	3.40	3.40
π Herculis	3.5	....	3.41	3.41
δ Draconis	3.0	....	3.42	3.42
γ Bootis	3.5	3.38 ?	3.43	3.43
δ Herculis	4.0	....	3.44	3.44
β Cephei	3.0	....	3.45	3.45
β Capricorni	3.5	3.32 ?	3.46	3.40
γ Lyræ	3.0	....	3.47	3.47
γ Cephei	3.0	....	3.48	3.48
ε Cassiopeiæ	3.5	....	3.49	3.49
θ Aquilæ	3.5	3.57 ?	3.50	3.50
δ Andromedæ	3.0	....	3.51	3.51
ζ Pegasi	3.0	....	3.52	5.32
ζ Cygni	3.0	....	3.53	3.53
α Trianguli Bor.	3.5	....	3.54	3.54
λ Aquilæ	3.0	3.57 ?	3.55	3.55
ι Draconis	3.0	....	3.56	3.56
μ Pegasi	4.0	....	3.57	3.57
χ Draconis	4.5	....	3.58	3.58
η Cassiopeiæ	4.0	....	3.57	3.57
θ Pegasi	4.0	....	3.60	3.60
δ Aquilæ	3.5	3.64 ?	3.61	3.61
π Sagittarii	4.5	3.40	3.62	3.40
ζ Cephei	4.0	....	3.64	3.64
η Cephei	3.5	....	3.65	3.65
λ Sagittarii	4.0	3.13 ?	3.66	3.2 ?
β Delphini	4.0	....	3.67	3.67
α Delphini	3.5	....	3.68	3.68
ι Herculis	4.0	....	3.70	3.70
α Draconis	3.5	....	3.71	3.71
ι Cephei	4.0	....	3.73	3.73
η Serpentis	4.0	3.51 ?	3.74	3.6 ?
τ Sagittarii	4.0	....	3.76	3.76
ε Aquarii	4.5	....	3.77	3.77
γ Ophiuchi	4.0	....	3.79	3.79
γ Delphini	4.0	....	3.80	3.80
ξ Sagittarii	5.0	....	2.82	3.82
ζ Aquarii	4.0	....	3.83	3.83
γ Capricorni	4.0	3.98 ?	3.86	3.86
γ Aquarii	4.0	....	3.88	3.88
γ Piscium	4.5	....	3.89	3.89
ξ Draconis	3.5	....	3.91	3.91
β Aquilæ	3.5	....	3.92	3.92
λ Draconis	3.5	....	3.94	3.94

(433) It cannot be expected that two lists arranged, the one in the northern and the other in the southern hemisphere, should agree, except in respect of stars which attain a considerable altitude at either station; and we accordingly find that low stars (in our latitudes), such as α *Hydræ*, δ *Scorpii*, β and γ *Corvi*, σ, π, and λ *Sagittarii*, stand lower in this list than they undoubtedly ought, and, *vice versâ*, that some stars, high in our horizon, but low in respect of that of the southern station of observation, such as *Polaris*, α *Andromedæ*, β *Pegasi*, β *Arietis*, higher in comparison with the general mass. In the column of adopted magnitudes, regard is had to this by the preference of the result obtained at the most favourable station, wherever cases of conflict arise between values without a ? attached.

(434) In the interpolation of these values, the values of Table C have been used so far as they could be used with perfect security—that is, as far as about the magnitude 3.3. Beyond this point they have been (not supplanted, but) aided by the catalogued magnitudes, in the manner explained in Art. 243, with whose indications they coincide very well, except in the cases of low stars. And, on the whole, I doubt not that, within the range of magnitudes embraced in this list, the connexion of the northern with the southern nomenclature will be found practically established to the satisfaction of astronomers.

APPENDIX B.

On the Difference of Level between the Royal Observatory C. G. H. and Feldhausen.

(435) The Observatory barometer with which mine has from time to time been compared is that by Jones, fixed to the pier of the mural circle. The height of its cistern above the floor is 2 feet 6 inches, and above the level of the sea about 32 feet.

The barometer of comparison was a portable one by Troughton, the same which has accompanied me in all my expeditions, and which was sent out by me in charge of the late Professor Henderson, for the purpose of ascertaining the difference of zero points between the standard barometer of the Royal Society (R) and the mural circle barometer (J) above mentioned, which he thus ascertained to be as follows :—

1832.	By first comparison—Going out from London to C. G. H. . . .	$J = R + 0.009$
1833.	By second ditto —Returning from C. G. H. to London . . .	$J = R + 0.007$

Mean, $J = R + 0.008$; the portable barometer thus appearing to have preserved a very satisfactory fixity of its zero point during the interval, including both voyages. During the voyage homeward, Mr. Henderson took the opportunity of comparing this barometer with that of the Observatory at St. Helena, then under the direction of Lieut. Johnson, which was thus ascertained to read 0.026 *higher* than the standard of the Royal Society.

(436) Previous to embarking for the Cape, I procured the same barometer to be compared with that of the Royal Society above mentioned (the standard constructed by Professor Daniell), the result of which comparison was $R = H + 0.050$, 1833, Oct. 10...23, A. Comparison with the Observatory barometer made soon after my arrival at the Cape, viz. from

March 26 to April 4, 1834, gave J = H + 0.055, whence J = R + 0.005. These three determinations, whose mean is + 0.007, satisfactorily prove the fixity of zero of the Cape barometer; the differences, though regularly progressive, being too minute to be calculated upon as certain.

(437) The observations by which the difference of level between the Observatory and Feldhausen has been determined, were those taken at both stations during the hourly meteorological observations at the equinoxes and solstices, during such term days as admit of a perfectly satisfactory comparison, both from circumstances of weather and from a direct intercomparison of instruments free from all doubt of change in the intervals—a condition rendered necessary by having been obliged, on more than one occasion, to refill the portable barometer, by reason of accidents. The term days selected are those of the 21st and 22nd Dec. 1834, June and Dec. 1835; March and June, 1836; and June and September, 1837; and the results are as follows:—

	Dec. 1834.	June, 1835.	Dec. 1835.	March, 1836.	June, 1836.	June, 1837.	Sept. 1837.
No. of hourly observations	26	37	34	34	31	35	36
Mean temperature of air	69.6	54.0	68.6	65.1	53.8	56.1	55.4
Mean difference of barom. readings reduced to 32	0.170	0.188	0.199	0.196	0.201	0.263	0.273
Zero correction	−0.059	−0.059	−0.078	−0.062	−0.078	−0.149	−0.149
Barometric excess	0.111	0.129	0.121	0.134	0.123	0.112	0.124
Corresponding to feet	97.13	112.87	105.87	103.25	107.62	98.00	108.50
Correction for temperature of air	+8.13	+5.52	+8.62	+7.60	+5.21	+5.25	+5.64
Difference of level	105.26	118.39	114.49	117.25	112.83	103.25	114.14

The mean of these seven results gives 112.23 feet for the difference of level between the cisterns of the barometers at the Observatory and at Feldhausen, the latter being the higher.

APPENDIX C.

On the Temperature acquired by the Surface Soil under Exposure to clear Sunshine, and some other Effects of Accumulated Solar Radiation; and on the Quantity of Heat given out by the Sun. Suggestion of an Improvement on the Ice Calorimeter.

(438) In Art. 429, the temperature acquired by the surface soil of the sandy region called the Cape Flats, intervening between table and false bays, is stated to amount frequently to 140° or 150° Fahr. That this is no exaggeration, the following experiments on thermometers variously exposed will show:—

Oct. 30, 1837. At $2^h\ 51^m$ apparent time, P.M., the sun's rays being already oblique, the following temperatures were taken:— °

Thermometer just immersed in a heap of earth cast up by ants, and quite dry 125

In a convex heap of sandy soil, in a small garden enclosure sheltered from wind, and moist at three or four inches below the surface	° 143
In contact with a stem of Albuca viridiflora in flower, at half an inch below the surface	120
Nov. 7, 1837. $2^h\ 23^m$ P.M. app. time. Temperature of a heap of garden mould just below the surface	155
Under the still green leaf of Brunswickia multiflora	96
In contact with the stem of a tuberous Pelargonium in full flower, just below the surface	131
Inserted an inch into the moist and decaying crown of Hœmanthus Tigrinus losing its leaves	102
Nov. 24, 1837. $1^h\ 45^m$ P.M. app. time. Temperature of a heap of garden mould	145·5
Dec. 1, 1837. $0^h\ 36^m$ P.M. In a sand heap sheltered from wind, in the small garden enclosure above mentioned	162
Dec. 3, 1837. $0^h\ 21^m$ P.M. Thermometer in the sun, supported $2\frac{1}{2}$ inches above the soil of a hard trodden sandy path	A = 117.5
Buried a quarter of an inch deep, in contact with a seedling fir of this year's growth, quite healthy	B = 148.2
Temperature of air at same time in shade	C = 88.5
Wet bulb thermometer. Same exposure	D = 64.6
„ $1^h\ 30^m$ P.M. Same exposures	A = 118.0, B = 149.8, C = 90.5, D = 63.5
„ $1^h\ 50^m$ P.M. „	A = 121.0, B = 150.8, C = 90.5, D = 65.5
„ $2^h\ 44^m$ P.M. „	A = 114.8, B = 148.0, C = 90.0, D = 63.5
„ $4^h\ 12^m$ P.M. „	A = 107.5, C = 84.5, D = 63.5
Dec. 5, 1837. $1^h\ 15^m$ P.M. External thermometer in shade	E = 98
Wet bulb thermometer also in shade	F = 68.5
Thermometer under the soil of the garden	G = 159
„ $1^h\ 57^m$ P.M.	E = 95.5, F = 68.5, G = 159
„ $2^h\ 57^m$ P.M.	E = 91.5, F = 68.5, G = 150
„ $4^h\ 13^m$ P.M.	E = 91.2, F = 70.5, G = 119
„ $5^h\ 0^m$ P.M. Temperature of soil (long since shaded), at four inches below the surface,	102

(439) When, however, the heat communicated from the sun is confined and prevented from escape, and so forced to accumulate, very high temperatures are attained. Thus, in a small mahogany box blackened inside, covered with window-glass fitted to the size, but without putty, and simply exposed perpendicularly to the sun's rays, an enclosed thermometer marked, on Nov. 23, 1837, 149°; on Nov. 24, 146°, 150°, 152°, &c. &c. When sand was heaped round the box, to cut off the contact of cold air, the temperature rose on Dec. 3, 1837, to 177°. And when the same box, with its enclosed thermometer, was established under an external frame of wood well sanded up at the sides, and protected by a sheet of window-glass (in addition to that of the box within), the temperatures attained on Dec. 3, 1837, were—at $1^h\ 30^m$ P.M. (Appar. T.) 207°.0; at $1^h\ 50^m$, 217°.5; and at $2^h\ 44^m$, 218°, and that with a steady breeze sweeping over the spot of exposure. Again on Dec. 5, under a similar form of exposure, temperatures were observed at $0^h\ 19^m$ of 224°; at $0^h\ 29^m$, 230°; at $1^h\ 15^m$, 239°; at $1^h\ 57^m$, 248°; and at $2^h\ 57^m$, 240°.5. As those temperatures far surpass that of boiling water, some amusing experiments were made by exposing eggs, fruit, meat, &c., in the same manner (Dec. 21, 1837, et seq.), all of which, after a moderate length of exposure, were found perfectly cooked—the eggs being rendered hard and powdery to the centre; and on one occasion a very respectable stew of meat and vegetables was prepared, and eaten with no small relish by the entertained bystanders. I doubt not, that by multiplying the enclosing vessels, constructing them of copper blackened inside, insulating them from contact with each

other by charcoal supports, surrounding the exterior one with cotton, and burying it so surrounded in dry sand, a temperature approaching to ignition might readily be commanded without the use of lenses.

(440) Immediately subsequent to the December solstice of 1836, some experiments were instituted for the purpose of ascertaining the absolute force of solar radiation by its direct unimpeded effect in communicating heat to a given quantity of water in a given time, the rays being intromitted through an aperture of given area. The opportunities taken for experiment being when the zenith distance of the sun was under 12°, the uncertainty, if any, which may be supposed to attach to the law of reflection of light and heat at oblique incidences will have no perceptible influence on the result; and the quantity of heat lost by reflection at the surface of the water will be almost precisely the same as at a perpendicular incidence, which by Fresnel's formula (presuming light and heat to be similarly reflected) is 0.0207 of the incident beam. The form of the experiment was as follows:—A light cylindrical vessel of tinned iron, open at the top $3\frac{3}{4}$ inches in diameter, and 2.4 in. in depth, weighing 1069 grains, was nearly filled with water moderately darkened by a slight admixture of ink. This vessel was placed on a light wooden support, covered with cotton cloth, and touching it only in a narrow ring (to avoid the communication of heat by conduction), in the interior of an iron cylinder of much larger diameter, to protect it from wind and external radiation, the upper part of which was covered by an iron plate well protected from sunshine by several separate diaphragms of paper laid lightly one over the other thereon. This plate had a circular aperture somewhat wider than that of the tin cylinder, and vertically over it, centre corresponding to centre. The mouth of the tin cylinder was covered with a circle of stiff paper, having an aperture exactly circular and concentric with the cylinder, so as to admit a vertical or nearly vertical sunbeam somewhat less in section than the vessel, and *wholly incident on the surface of the contained liquid.* This cover also projected over the exterior of the cylinder on all sides, so as to prevent any ray from striking on its outside, even when the upper iron plate was removed from the exterior vessel. Lastly, to cut off effectually all lateral radiation from the region of sky near the sun, a paper diaphragm but very little more in aperture than the mouth of the tin cylinder was laid concentrically on the upper iron plate and its diaphragms.

(441) Plunged into the liquid, and resting on the bottom when not in use, was a circular plate of mica $3\frac{1}{4}$ inches in diameter, attached to a light rod of reed 0.1 inch in diameter, for the purpose of completely stirring and mixing the strata of the liquid by one or two up and down movements. When thus prepared, the whole apparatus was placed in the sunshine at noon, or somewhat before, and so adjusted that on the admission of sunlight a narrow ring of light surrounded concentrically the aperture in the diaphragm of the tin cylinder beneath, which was carefully watched during the progress of the experiment, and kept unaltered. These arrangements being made, the sun was shaded off—the temperature of the liquid (after stirring by the mica-plate) taken by an exceedingly delicate and sensitive thermometer by Crichton, and again after a certain noted number of minutes. The shade being then removed, the sun was allowed to shine into the aperture on the liquid, for ten minutes. During this exposure, the liquid was three times stirred by the mica-plate, allowing five seconds for each stirring, and shading the aperture during that operation (which, of course,

was not counted as part of the ten minutes' exposure). The temperature was now again taken, and, after remaining shaded again a certain noted number of minutes, finally once more. The mean of the minutely change of temperature, deduced from the shade observations, being obtained, was applied as a correction (in all cases a very small one) to the minutely elevation of temperature in the sun exposure; and thus the true effect of the sun was concluded. The following detail of an experiment of this kind, made on Dec. 31, 1836, will more fully explain the nature of the process :—

Quantity of inked water used (supposed to have the same capacity for heat as pure water) = 4500 *grains. Tin vessel* = 1069 *grains, equivalent in capacity to* 134 *grains of water. Stirrer* = 20 *grains, equivalent to* 4 *grains of water. Total quantity heated* = 4638 *grains of water. Diameter of aperture* = 3.024 *inches, area* = 7.1821 *square inches, which, multiplied by cos.* 10° 51′, *the sun's zenith distance, gives* 7.0538 *for the area of the section of the sunbeam.*

Apparent Time. h. m. s.			
11 51 0	—Temperature of the shaded liquid	72.3	Gained in 4^m, + 0°.1
11 55 0	—Liquid exposed to ⊙. Temperature	72.4	
0 5 15	—Liquid shaded (having been three times stirred). Temperature taken	76.3	Gained in 10^m, + 3°.9
0 15 0	—Temperature finally taken	76.4	Gained in 10^m, + 0°.1

The gain of heat per minute, in the sun, is 0.390; and in the shade, by a mean of both observations, + 0.017 ; consequently, 0.373 is the effect due to the sun alone, per minute.

(442) If we define the actine to be that intensity of solar radiation, which, if entirely intromitted and absorbed, would suffice to melt one-millionth of a metre in thickness per minute off the surface of a sheet of ice co-extensive in area with the sunbeam, and perpendicularly exposed to it;—if, moreover, we designate by Δ the minutely increase of temperature operated in a quantity of water (or equivalent water) Q grains; by S, the sectional area of the sunbeam; by A, the number of actines expressing the intensity of the beam;—and if, further, we denote by c the grains (252.46) in a cubic inch of water; by λ, the latent heat of ice (135°.5); by m, the inches (39.37079) in one metre; and by I, the ratio of the intromitted to the incident heat (= 0.9793, very nearly constant for such small incidences);—we shall have, for the intensity of the sunbeam in question,

$$A = \frac{1000000 \,.\, Q \,.\, \Delta}{S \,.\, I \,.\, c \,.\, m \,.\, \lambda} = [9.87978] \,.\, \frac{Q\,\Delta}{S}$$

In the experiment above related, we have $Q = 4638$, $\Delta = 0.373$, $S = 7.0537$; whence $A = 185.96$, the power of the sun on this occasion expressed in actines, as above specified.

(443) The following are the particulars and results of six experiments of this kind:—

Date.	Sun's zenith distance.	Area of aperture in square inches.	Sectional area of sunbeam, S.	Water grains heated, Q.	Heating effect per minute, Δ.	Sun's power in actines.	Remarks.
1836	° ′				°		
Dec. 23...	10 29	6.9750	6.8585	4636	0.320	164.0	Wind. Apparatus not sufficiently sheltered.
Dec. 24...	10 30	7.1821	7.0619	4738	0.432	219.7	All circumstances eminently favourable, but experiment not well made.
Dec. 27.	10 36	7.1821	7.0595	4638	0.400	199.2	Cirrous haze.
Dec. 31...	10 51	7.1821	7.0538	4638	0.373	186.0	Clear sky. Good experiment.
1837.							
Jan. 1. ..	10 55	7.1321	7.0031	4638	0.387	194.3	Superb Sky. A slight shadow of the stirring rod allowed for.
Jan. 9. ..	11 50	7.1821	7.0294	4638	0.370	185.1	Pure water used. Sky perfect.
Mean	......	......	......	......	......	191.4	

(444) From these experiments, it appears that at midsummer, at noon, and at 140 feet above the mean sea level, the force of the sun's radiation at the Cape of Good Hope is such as would suffice to melt 191.4 millionths of a metre in thickness per minute, from a surface of ice perpendicularly exposed to its action (if wholly intromitted and absorbed); that is to say, 0.0075355 in., which is at the rate of an inch in 2 hours 12 min. 42 sec. If this fraction (0.0075355) be multiplied by the square of the cosecant of $16' \, 1''.5$, the sun's apparent semi-diameter, we get 347.15 in. or 28.93 feet, for the thickness of ice which the sun's ordinary expenditure of heat would suffice to melt per minute, *at its own surface*,* supposing it partly intercepted by an atmosphere similar in constitution and equal in thickness to that of the earth. As the heat absorbed in traversing our atmosphere cannot be taken at less than one-third of the total incident heat, this would give 43.39 feet per minute for the unimpeded effect of the solar radiation so estimated. M. Pouillet concludes from his experiments (made in June 1837) 11.80 met. or 38.71 feet for the value of this element. Taking it at 40 feet, which, as intermediate between the two estimates, cannot be far from the truth, it will appear, by an easy calculation, that the ordinary expenditure of heat by the sun, per minute, would suffice to melt a cylinder of ice 184 feet in diameter, and in length extending from that luminary to α Centauri. *Aliter*, that a cylindrical rod of ice, 45.3 miles in diameter, and of indefinite length, continually darted into the sun *with the velocity of light*, would barely suffice to employ its whole radiant heat for its fusion, without at all reducing the temperature of the surface.

(445) The weight or bulk of ice at the glacial temperature (32), which a certain quantity of heat is capable of melting, is the most definite, perhaps the only definite, measure of that quantity; being, so far as we can see, strictly proportional to it, which we are not sure to be the case as to increase of temperature in solids and liquids, in all parts of the thermometric scale; and which, we are sure, is not the case as to their dilatation. I may, therefore, be

* This mode of figuring to ourselves the *temperature* of the solar surface is due to M. Pouillet, and is perhaps the best and most illustrative the subject admits of.

allowed here to offer a suggestion for the improvement of the Ice Calorimeter of Lavoisier and Laplace, which may rescue it from the disrepute into which it has (it appears to me undeservedly) fallen, in consequence of the experiments of Wedgwood (Phil. Trans. 1784), and restore it to the place it ought to hold as an exact philosophical instrument. The objections brought against it in the paper referred to are twofold: 1st, That the drainage of the water melted off from the pounded ice is uncertain; and 2nd, That while melting in one part of the apparatus, it is arrested and prevented from running off by actually freezing again in another. The former of these objections is undoubtedly valid, especially when small quantities are concerned. As part of the ice is melted, its capillary communications and cells are altered in dimension; and they are also otherwise changed by the collapse of the solid ice. The simultaneous thawing and freezing, on which the latter objection is grounded, undoubtedly took place in the experiments described by Wedgwood, and is attempted to be accounted for by him on grounds to which no one at this time will attribute any weight. It is impossible, in short, but that that ingenious artist must have been deceived as to the real temperature of his ice. In no other way are the facts, as related by him, explicable. Still, that he should have been so deceived is enough to satisfy us that nothing short of actual immersion of the pounded ice in water (the use, that is to say, of a mixture of ice or snow and water) can satisfactorily ensure the absence of an undue degree of cold in the interior of the fragments of ice used. If this, however, be made a condition of the experiment, it is evident that the estimation of the ice melted, by drainage, can never lead to any precise results. On the other hand, if we estimate it *by the diminution of volume of the total mass of mixed ice and water used*, produced by the melting of part of the ice, there is no limit to the precision which may be attained other than the mechanical difficulty of so arranging the apparatus as to afford an exact measure of the *difference* of volumes before and after the experiment. For this purpose it is necessary that the mixed mass in question shall be enclosed in a vessel which it exactly fills, terminating, in its upper part, in a long graduated open tube, to a certain division of which, as a zero point, the water can be driven by an adjusting screw. Into an insulated and water-tight chamber within this, communicating with the external air by no larger adit than is necessary, and which must be immediately stopped by a non-conducting plug or stopper, must be introduced the source of heat to be subjected to experiment. The whole apparatus must then be plunged into a mixture of snow and water, effectually to cut off all communication of heat from without.

(446) The construction of this interior chamber, and the best mode of introducing into it the substances operated on, will necessarily vary according to the nature of the experiment. For the combustion of substances in oxygen, no communication with the external air is needed, as their ignition may be effected within glass or copper vessels completely insulated, by the voltaic circuit. For inquiries into the heat given off by the mixture of chemical ingredients, a small tubular communication with the external air will in many cases suffice; and when liquids only are concerned, it will often be practicable to insure their mixture within a perfectly insulated chamber, by the breaking of thin glass globes containing them, by agitation, &c. But it is unnecessary to enumerate cases, for each of which a moderate application of mechanical ingenuity will readily suggest the appropriate contrivance.

APPENDIX D.

Approximate Places of Seventy-Six Ruby Coloured, or very intensely Red, Insulated Stars, noticed in the course of observation, in either Hemisphere.

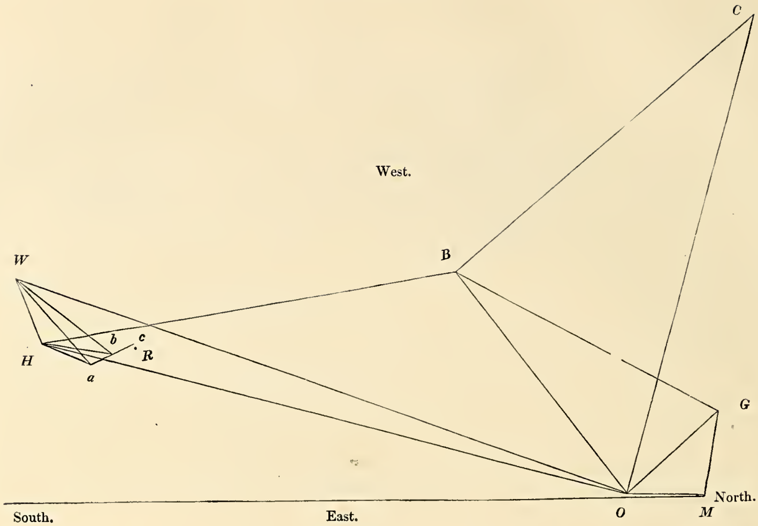
R A. 1830.	N P D. 1830.	Mag.	Description.
h. m. s.d.	° ′ ″		
0 0 38.0	26 59 49	8′	A ruby star.
0 47 15.2	23 13 50	9	Deep orange red.
0 55 52.4	37 28 25	10	Full garnet colour.
1 19 8.7	123 26 1	6	Most beautiful orange red. Two observations.
1 51 47.5	35 35 47	8′	Almost ruby red.
1 58 2.9	89 22 13	7	Very red.
2 7 21.2	45 35 0	9	Very full red; almost ruby.
2 10 46.9	93 45 3	8′	Very full ruby; sanguine.
2 26 8.5	33 40 27	9	Fine ruby red.
3 8 15.8	147 57 44	7′	High orange or brick red.
3 32 41.6	75 45 10	9	Very red; almost ruby.
3 33 10.8	36 38 21	9	Very fiery; almost scarlet.
4 34 12.6	57 24 3	8′	Remarkable ruby red.
4 37 41.9	38 4 43	9′	Very fiery; almost ruby.
4 40 52.7	61 46 21	8	A very extraordinary ruby coloured star; a most intense and beautiful colour. Two observations.
5 9 35.5	55 54 36	8	Very remarkably red. ? minute of R A.
5 38 28.9	136 32 15	8	Vivid sanguine red, like a blood drop. A superb specimen of its class.
6 2 51.8	62 48 1	8′	Ruby coloured.
6 15 46.5	75 11 35	7	Vivid red.
6 16 53.0	116 57 53	8	Very intense ruby coloured.
6 24 48.0	51 26 47	6′	Superb orange red; very rich colour.
7 15 59.5	115 26 23	7	Very intense fiery red.
7 40 1.4	121 42 54	9	Very fine ruby colour.
7 52 25.1	139 31 57	8	Rich brick red, inclining to orange.
8 38 19.1	117 35 32	8′	Fiery red, very high colrd.
8 44 16.6	137 45 1	9	Ruby coloured.
8 45 46.8	72 8 10	8′	Very fine red, between ruby and orange. Brick red.
8 58 41.3	143 23 34	9	Ruby coloured.
9 27 56.0	152 2 48	8	Very intense sanguine star, between scarlet and carmine red.
9 48 31.0	130 47 12	7′	Scarlet; remarkably full rich colour. Three observations.
9 54 31.2	149 24 34	8′	Scarlet.
10 4 27.1	124 29 10	7	B. 2874. Scarlet. Three observations.
10 8 39.3	149 50 30	9	Ruby red.
10 27 40.9	128 41 21	6′	B. 3085. Extreme orange, almost scarlet. Two observations.
10 37 40.7	147 10 48	9	Ruby coloured.
10 52 10.4	107 24 40	8	Most intense and curious colour. Scarlet, almost blood colour. Follows *a Hydræ* 42ˢ.5, and is 1′ south of it.
11 4 27.3	170 52 12	8	Ruby, almost sanguine.
11 31 57.5	161 37 35	8′	Fine ruby, inclining to scarlet.
12 13 28.5	164 33 58	8′	Sombre red.
12 20 39.9	60 45 49	9	Peculiar rich ruby purple. Re-examined — no remarkable colour, but the star probably mistaken (in another *f*).
12 37 31.4	148 45 47	8′	In the field with β *Crucis*. The fullest and deepest maroon red; the most intense blood red of any star I have seen. It is like a drop of blood, when contrasted with the whiteness of β *Crucis*. Several observations.
12 54 33.1	150 31 4	9′	Full orange.
13 57 8.0	148 54 45	8	Double, equal. *Both stars brick red.*
14 4 46.1	149 7 4	7′	Ruby, or high orange.
14 16 32.4	63 31 1	7′	Vivid red; almost a bright ruby colour; fine.
14 25 0.0	132 37 13	9	Ruby coloured.
14 58 9.3	159 25 41	6	B. 5189. Almost scarlet. Two observations.
15 7 10.7	165 18 20	7	Very high red, or ruby.
15 40 45.8	163 59 3	9	Sombre red.
15 43 27.9	49 54 20	9′	Fine deep ruby colour.
15 52 50.1	53 29 17	10	Ruby red.
16 5 50.1	135 22 30	8′	Ruby, or very high red.
16 17 17.5	102 1 35	8	Dull brick red.
16 29 44.0	122 2 0	8	Deep red, like a drop of blood.
16 48 38.5	144 48 34	9	Intense ruby red. Two observations. (Double.)
17 18 48.3	125 29 33	9	Very deep red.
17 19 42.1	109 19 20	8′	A ruby star.
17 28 23.8	131 30 58	8	Beautiful ruby red.
17 28 42.2	147 37 41	8	Brilliant scarlet, or very high orange.
17 34 57.6	108 34 38	8	Remarkably red.
17 45 35.5	88 11 35	9	A curious ruby coloured st.
17 49 31.1	87 15 17	7′	A very fine orange star.
18 10 46.4	89 12 32	8	A very red star.
18 37 33.9	81 25 22	9	Plum coloured or ruddy purple.

R A. 1830.	N P D. 1830.	Mag.	Description.	R A. 1830.	N P D. 1830.	Mag.	Description.
h. m. s.d.	° ′ ″			h. m. s.d.	° ′ ″		
18 41 5.6	98 5 31	9	Most remarkably red.	20 17 32.1	118 48 37	8	Fine ruby coloured star.
19 24 35.7	106 43 15	7	Very remarkably red; high scarlet, or good ruby colour. Two obs.	21 8 42.8	160 26 40	6	Ruby red, inclining to orange.
19 56 30.9	117 42 14	7′	Fine ruby coloured star. Two observations.	21 37 19.7	52 54 47	8′	Most beautiful and extremely intense ruby colour. Two obs.
19 57 22.7	150 25 21	8′	Very red. Ruby star.	21 48 53.5	40 17 34	9	Fiery red. A very intense colour.
20 3 46.3	49 0 0	10	A fine dark ruby star.	21 56 17.0	62 28 0	8′	Very ruddy orange.
20 7 7.9	111 50 11	6′	A fine ruby star. Pure ruby colour. This is perhaps the finest of my "ruby stars."	23 40 32.3	45 45 40	10	Ruby coloured.

APPENDIX E.

Geodesical Determination of the Site of the Twenty-feet Reflector at Feldhausen with respect to the Royal Observatory of the Cape of Good Hope.

(448) The connection of Feldhausen with the Royal Observatory, and its relation of situation with respect to that building, and to Lacaille's station in Cape Town, is made out by the triangles in the annexed sketch; in which *O* is the station on the western wing of the Observatory, 33.71 feet from the centre of the western dome, from which Mr. Maclear's angles were taken; *M*, the meridian mark of the Royal Observatory transit instrument; *G*, a gun let into the ground, marking the western extremity of the base measured by him in 1837, for the verification of Lacaille's triangulation; *B*, a signal on the King's blockhouse battery, a very conspicuous and commanding position on the slope of the Devil Mountain; *C*, a chimney of Mrs. De Witt's house in Cape Town, 124 feet S.W. of Lacaille's station; *H*, the southern boundary stone of the Feldhausen grounds, common to them and the estate of Mr. Letterstedt, of Cape Town; and *W*, a conspicuous and very remarkable granite block on a low projecting promontory or spur of the Table Mountain, rising high enough over the protea bushes with which the wastes around are clothed, to command from its summit a superb and extensive *coup d'œil* of the whole surrounding country — the Cape Flats, the rugged range of hills extending from sea to sea beyond them, on the east, and the noble façade of the Table Mountain on the west.



(449) The data obligingly furnished me by Mr. Maclear, who was at the pains to transport a repeating circle, by Dollond, to the point H, and thereby to determine the angles OBH, OHW, so as to complete the triangles OBH and OHW, are as follows :—

Distances in feet . .	$OM = 2537.396$	$OB = 9864.60$	$BG = 10363.82$
" . .	$OG = 4241.88$	$OH = 21671.645$	$BC = 13444.95$
" . .	$OC = 17067.95$	$MG = 2915.325$	$BH = 15321.025$
Angles	$WOH = 5° 9' 33''$;	$WHO = 125° 41' 24''$.	

Whence we obtain

$$WH = 2576.31; \qquad OW = 23269.30.$$

Thus the positions of the points O and W are absolutely determined.

(450) The buildings and instruments at Feldhausen being so completely embosomed in trees as to admit of no part of them being seen, or even any signal sufficiently high to be erected so as to become visible to either H or W, a pin (a) was driven into the ground in the centre line of a long avenue of trees, leading in front of the house and alongside of the enclosure in which the telescopes were erected. Over this pin a signal was erected, visible from both H and W. The same was done at b, another pin also in the same central line, and distant from a by very exact measurement 516.25 feet, so as to serve as a small base of verification; the rods with which this was done being adjusted by the standard of the Royal Observatory. The following angles were then taken from H, W, a, and b, with a theodolite by Schenk of Berne, on the Reichenbach construction, a delicate

and beautiful instrument, which I had procured in Switzerland some years before, and brought out for any such occasional service as this, which might require its use:—

In triangle *Hab*, angle

$$a = 136^\circ\ 32'\ 15'', \qquad b = 36^\circ\ 11'\ 10'', \qquad H = 7^\circ\ 17'\ 0'';$$
$$\text{Sum} = 180^\circ\ 0'\ 25''; \qquad \text{Correction of each angle} - 8''.3;$$
$$\text{Corrected angles,} \quad a = 136^\circ\ 32'\ 6'', \qquad b = 36^\circ\ 11'\ 2'', \qquad H = 7^\circ\ 16'\ 52'';$$

Whence we conclude

$$Ha = 2404.65; \qquad Hb = 2801.88.$$

(451) In the triangle *Wab*, the measured angles were,—

$$a = 110\ 29\ 57.5, \qquad b = 63^\circ\ 37'\ 27'', \qquad W = 5^\circ\ 52'\ 8'';$$
$$\text{Sum}\ 179\ 59\ 32.5; \qquad \text{Correction of each angle} = +\ 9''.2;$$
$$\text{Corrected angles,} \quad a = 110^\circ\ 30'\ 7'', \qquad b = 63^\circ\ 37'\ 36'', \qquad W = 5^\circ\ 52'\ 17''.$$

Whence

$$Wa = 4521.03, \qquad Wb = 4726.62$$

These distances determine a and b.

(452) As a verification, the distance *WH* may be computed two ways. 1st, By Mr. Maclear's data from the triangle *OWH*, in which, having

$$OH = 21671.645, \qquad \text{angle } O = 5^\circ\ 9'\ 33'', \qquad \text{and angle } H = 125^\circ\ 41'\ 24'',$$

we find by computation

$$WH = 2576.31.$$

And 2ndly, By the triangle *WHb*, in which we have

$$\text{Angle } WbH = Wba - Hba = 63^\circ\ 37'\ 36'' - 36^\circ\ 11'\ 2'' = 27^\circ\ 26'\ 34'',$$

by the former triangles, and by measurements from H and W,

$$HWb = 30^\circ\ 4'\ 10'', \qquad WHb = 122^\circ\ 28'\ 23''.$$

The sum of the angles is $170^\circ\ 59'\ 7''$, and the deficiency $53''$, which must in this case be divided between the two angles W and H, the angle at b being already corrected. This gives, for the corrected angles in *WHb*,

$$W = 30^\circ\ 4'\ 36''.5, \qquad H = 122^\circ\ 28'\ 49''.5, \qquad b = 27^\circ\ 26'\ 34'';$$

with which, and the side $Hb = 2801.88$, we find

$$WH = 2576.56;$$

differing only by 0.25 of a foot, or 3 inches, from the other result. It should be observed, that the deviations of the angles in defect of 180° in these measurements are owing by no means to error in division of the instrument, but to the irregular form and awkward position of the observer and instrument on the crown of the granite crag W, which rendered nice observation from it impracticable.

(453) The site of the reflector (R) was now easily ascertained by prolonging ab to a further distance, $bc = 551.04$ feet, and thence erecting a perpendicular, $CR = 56.69$ feet, to the centre of its foundation ring. The geodesical coördinates of this point, from the centre of the transit instrument at the Observatory, were finally ascertained, by careful

measurement on a chart laid down on a large scale from these data, to be 17,595 feet in the direction of the meridian to the south, and 5190 feet in that of a parallel to the west of that centre. Its geographical situation was therefore in lat. 2′ 53″.55 south, and in long. $4^s.11$ to the west of the Cape Observatory. The record of its site is preserved on the spot by a granite column erected after our departure by the kindness of friends, to whom, as to the locality itself and to the colony, every member of my family had become, and will remain, attached by a thousand pleasing and grateful recollections of years spent in agreeable society, cheerful occupation, and unalloyed happiness.

FINIS.

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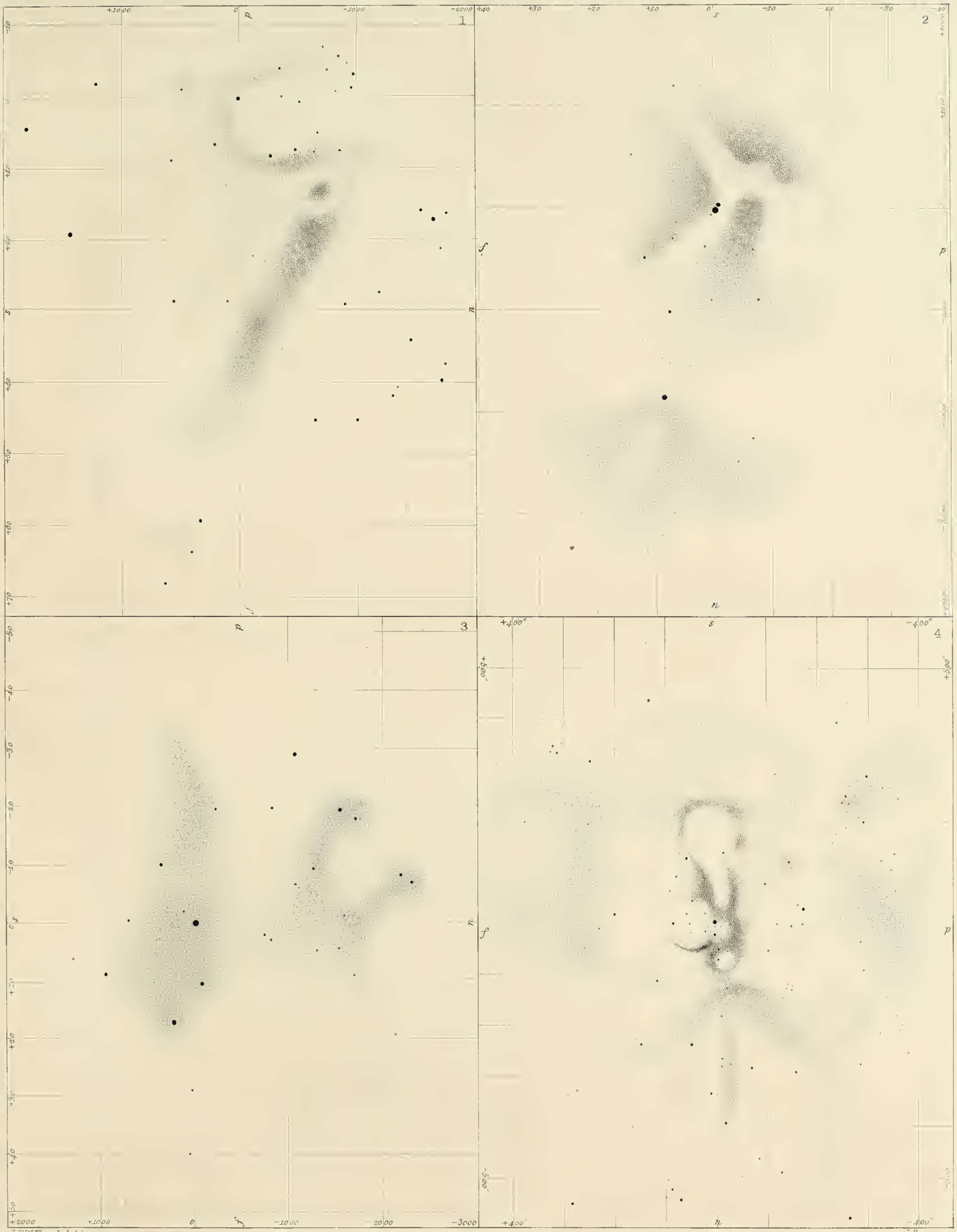

J. F. W. Herschel, delin. J. Basire sc.

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Plate III

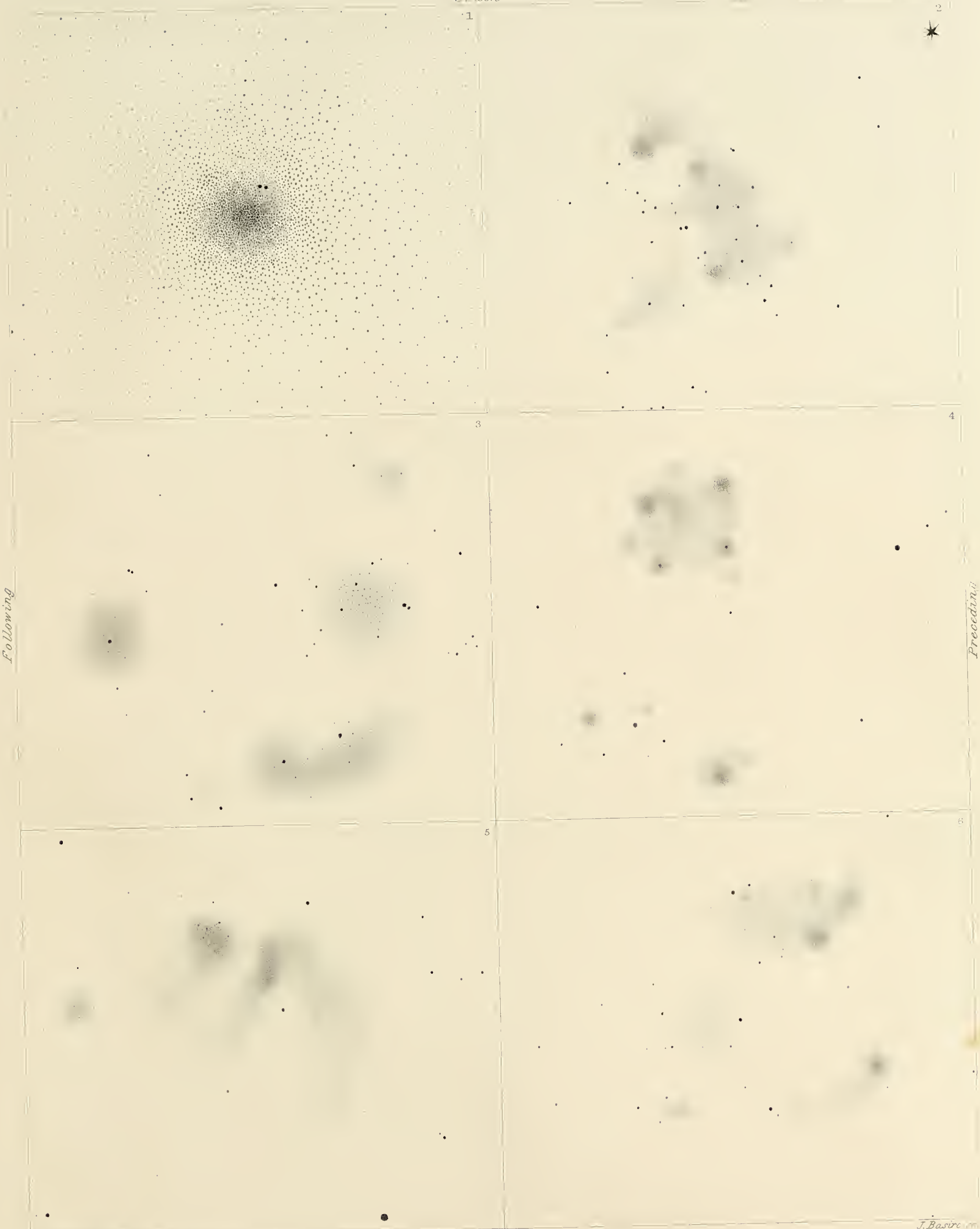

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Plate IV

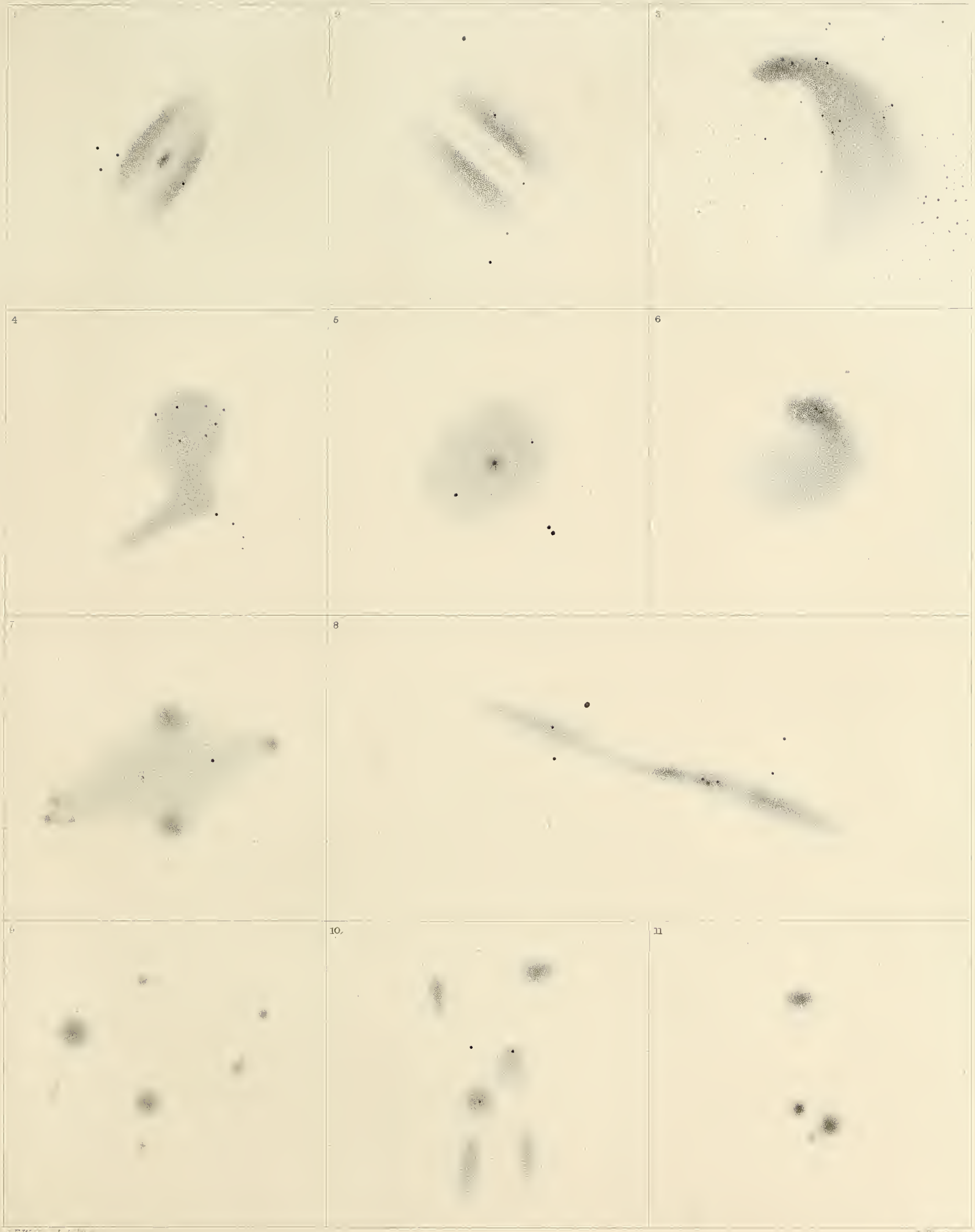

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Plate V.

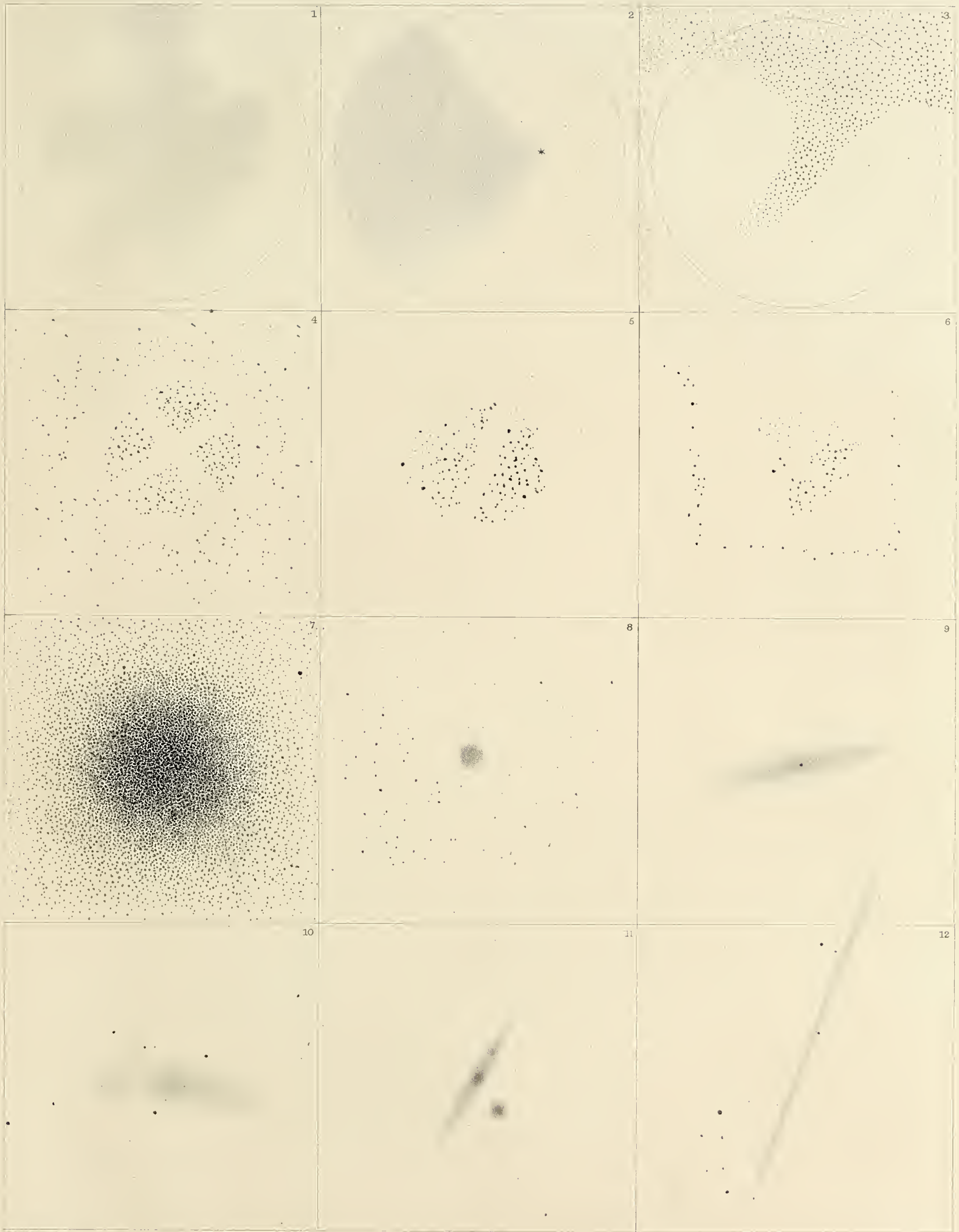

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Plate VI

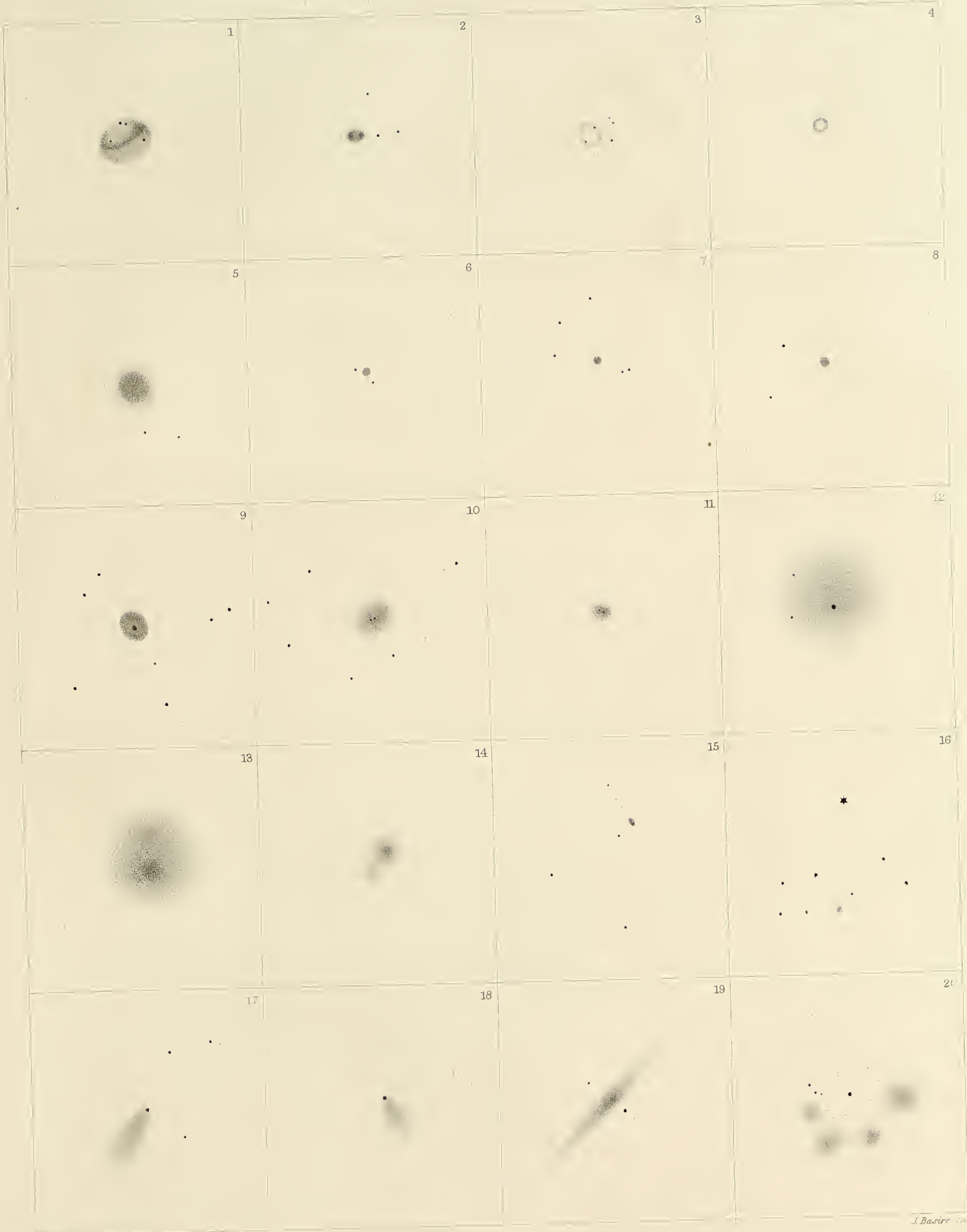

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Plate VII.

The two Magellanic Clouds as seen with the naked Eye.

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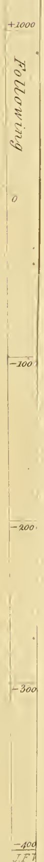
+1000
Following
0
−100
−200
−300
−400
J.F

The Great Nebula in the Sword-handle of Orion as seen in the Twenty-feet Reflector at Feldhausen. C. G. H.

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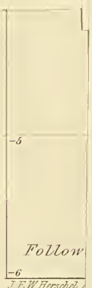
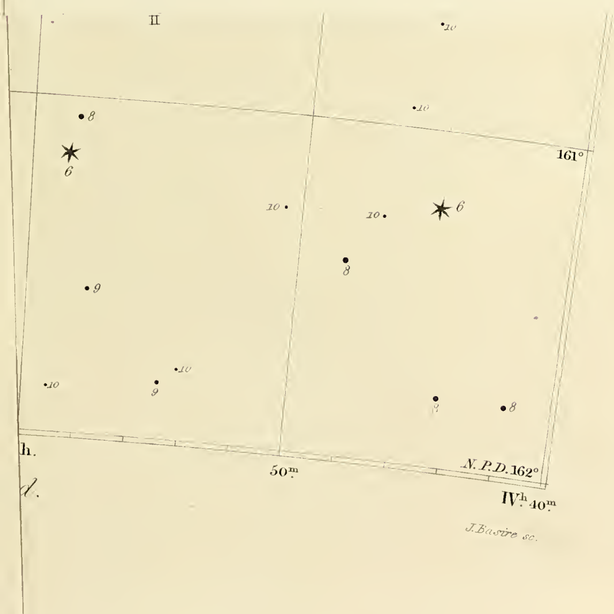

-5
Follow
-6
J.F.W.Herschel

The Great Nebula about η Argus as seen in the Twenty feet Reflector at Feldhausen C. G. H.


II
10
10
8
6
161°
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10
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10
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h.
50m
N. P. D. 162°
d.
IVh 40m
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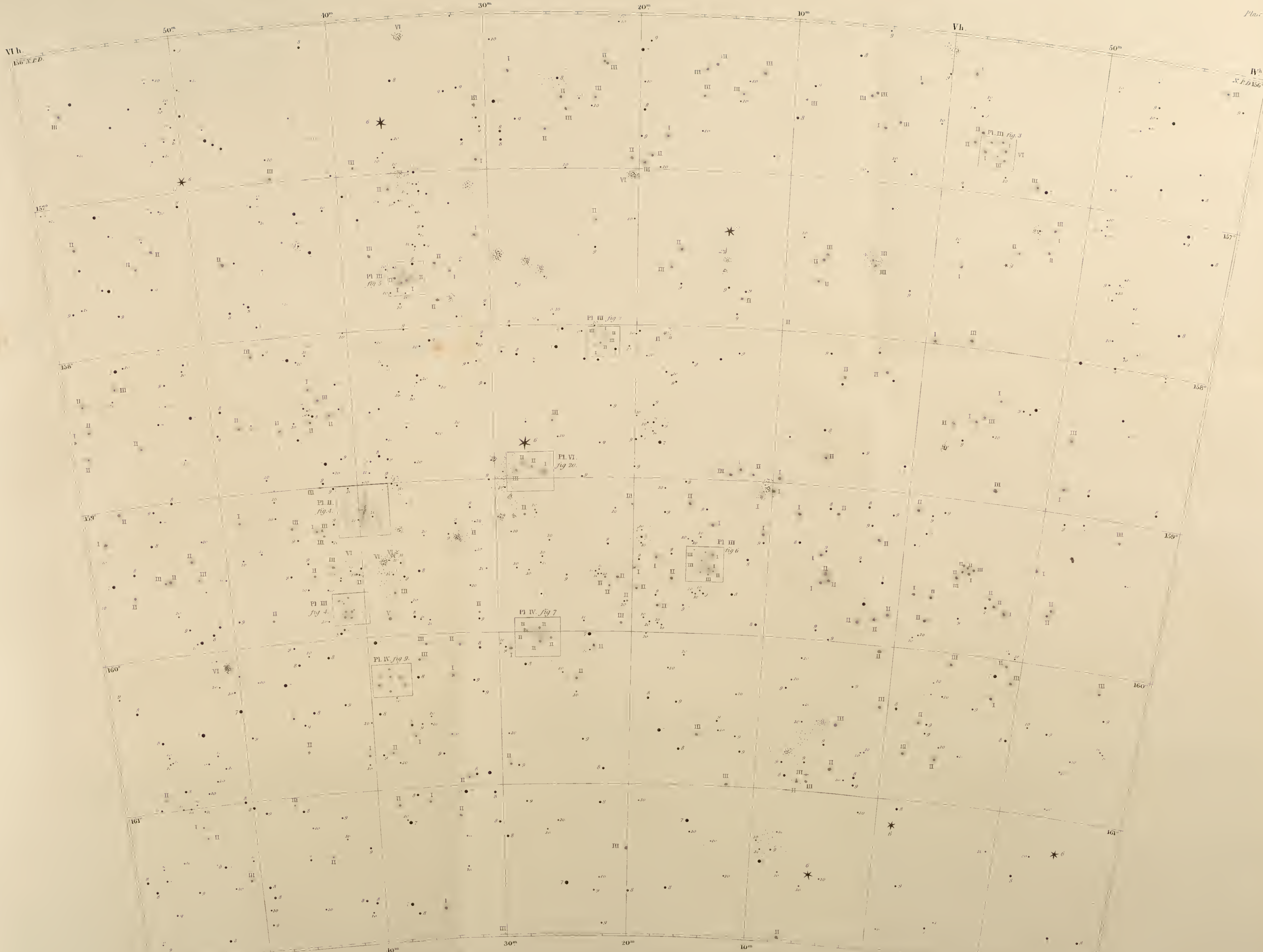
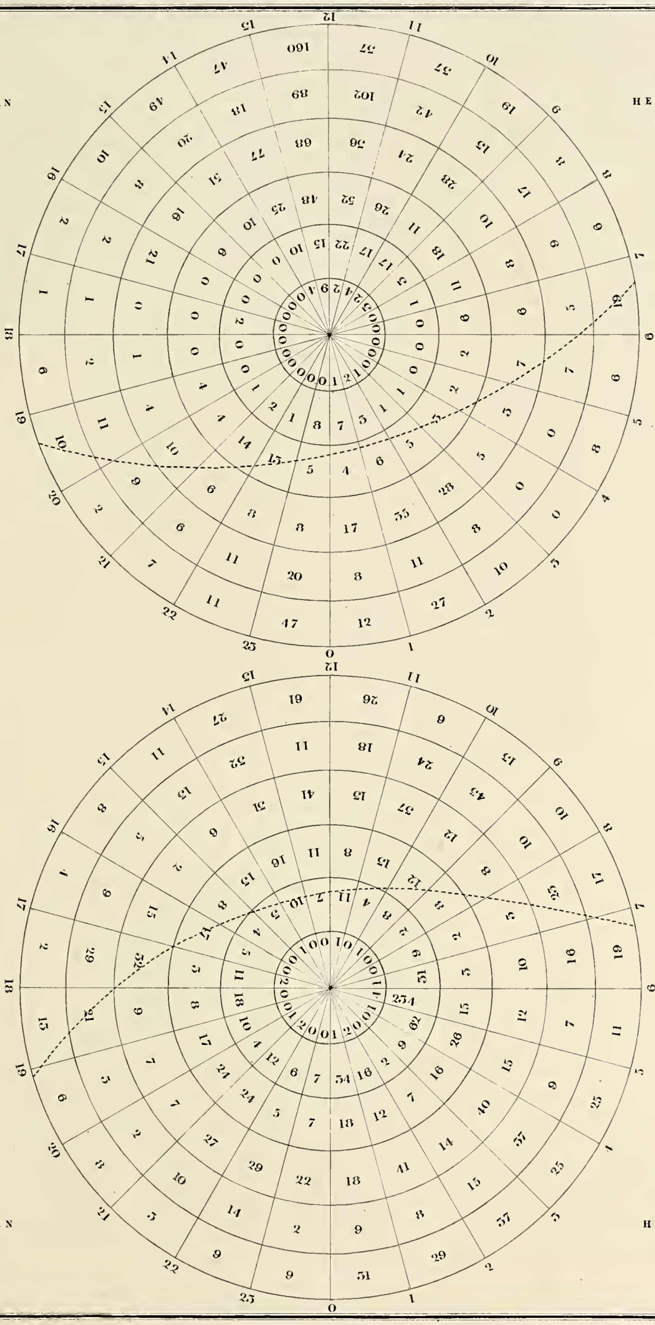


First Approximation to a Chart of the Nubecula Major, or greater Magellanic Cloud.

NB. The Arabic Numerals attached to Stars thus •8 denote their magnitudes. Roman Numerals attached to Nebulæ thus ✱ II. their Classes

E. Crisdall

NORTHERN HEMISPHERE



SOUTHERN HEMISPHERE

DISTRIBUTION OF NEBULÆ AND CLUSTERS IN THE TWO HEMISPHERES.

THE DOTTED LINE REPRESENTS THE COURSE OF THE MILKY WAY.

Fig. 1

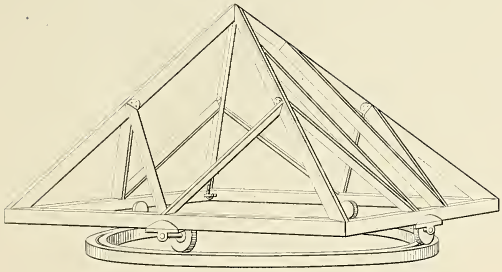


Fig. 2.

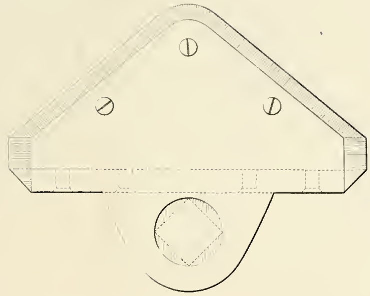
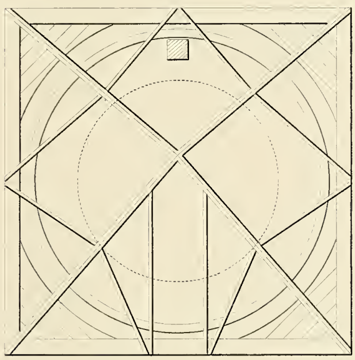


Fig. 3.



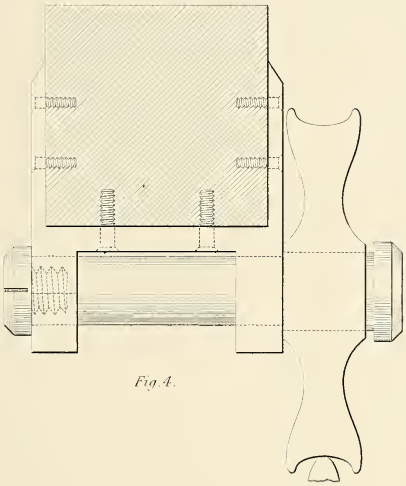


Fig. 4.

Fig. 5.

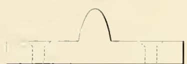


Fig. 7.

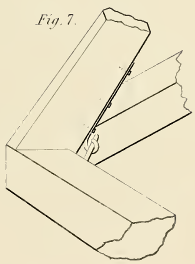


Fig. 6.

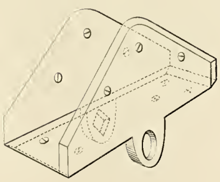
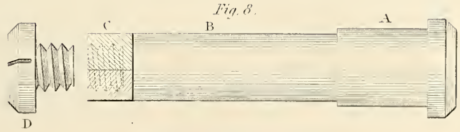


Fig. 8.



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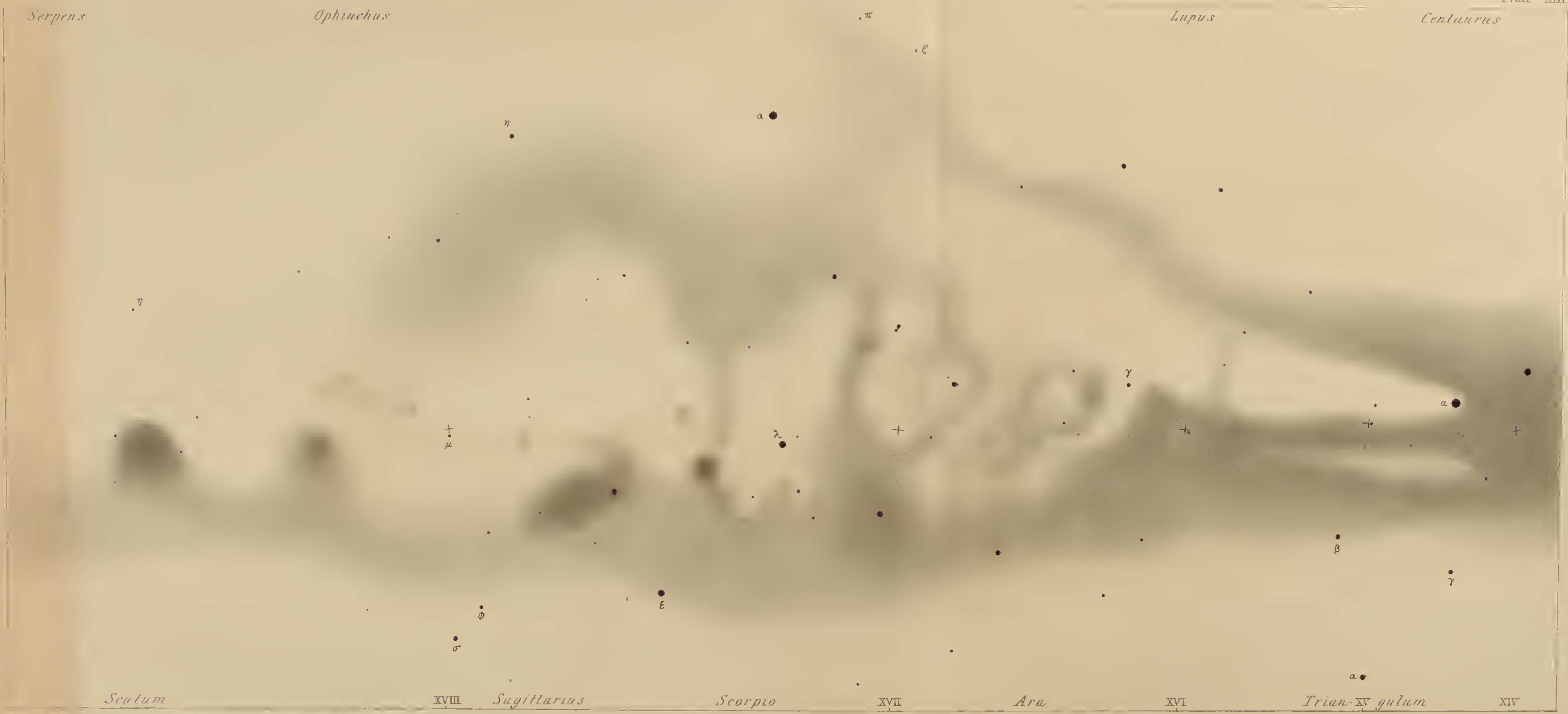
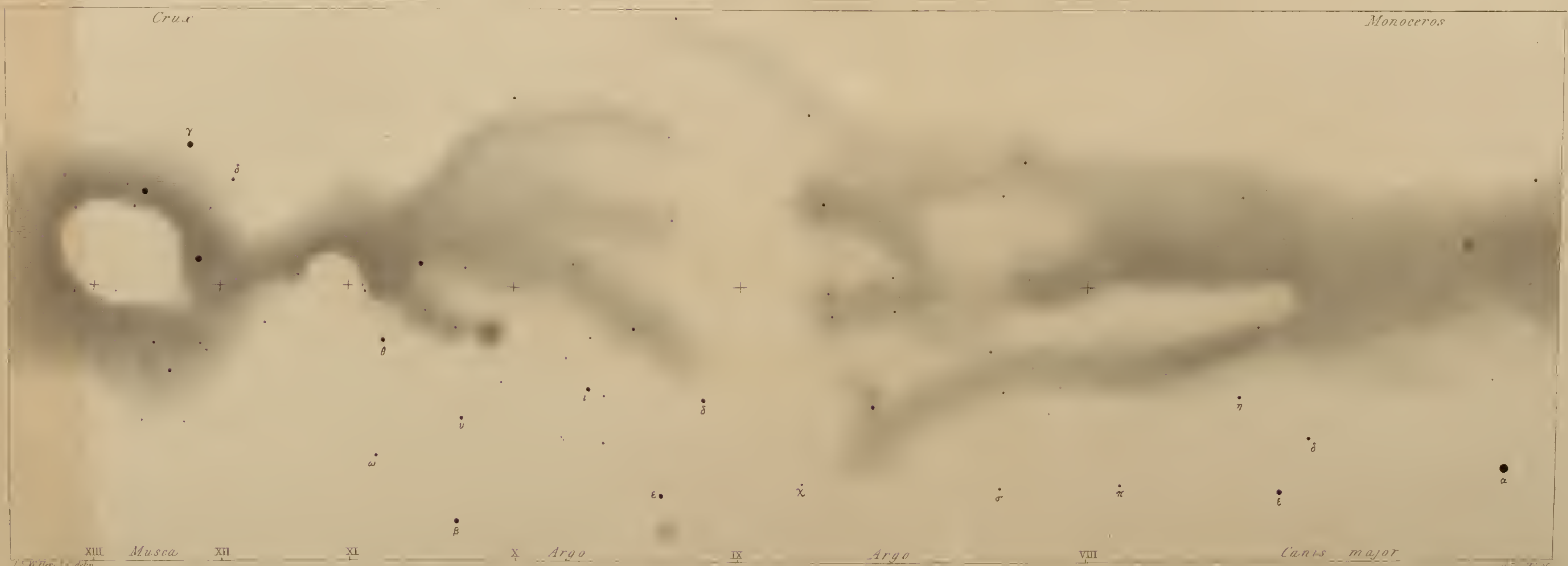
Course of the Southern Milky Way from Antinous to Centaurus

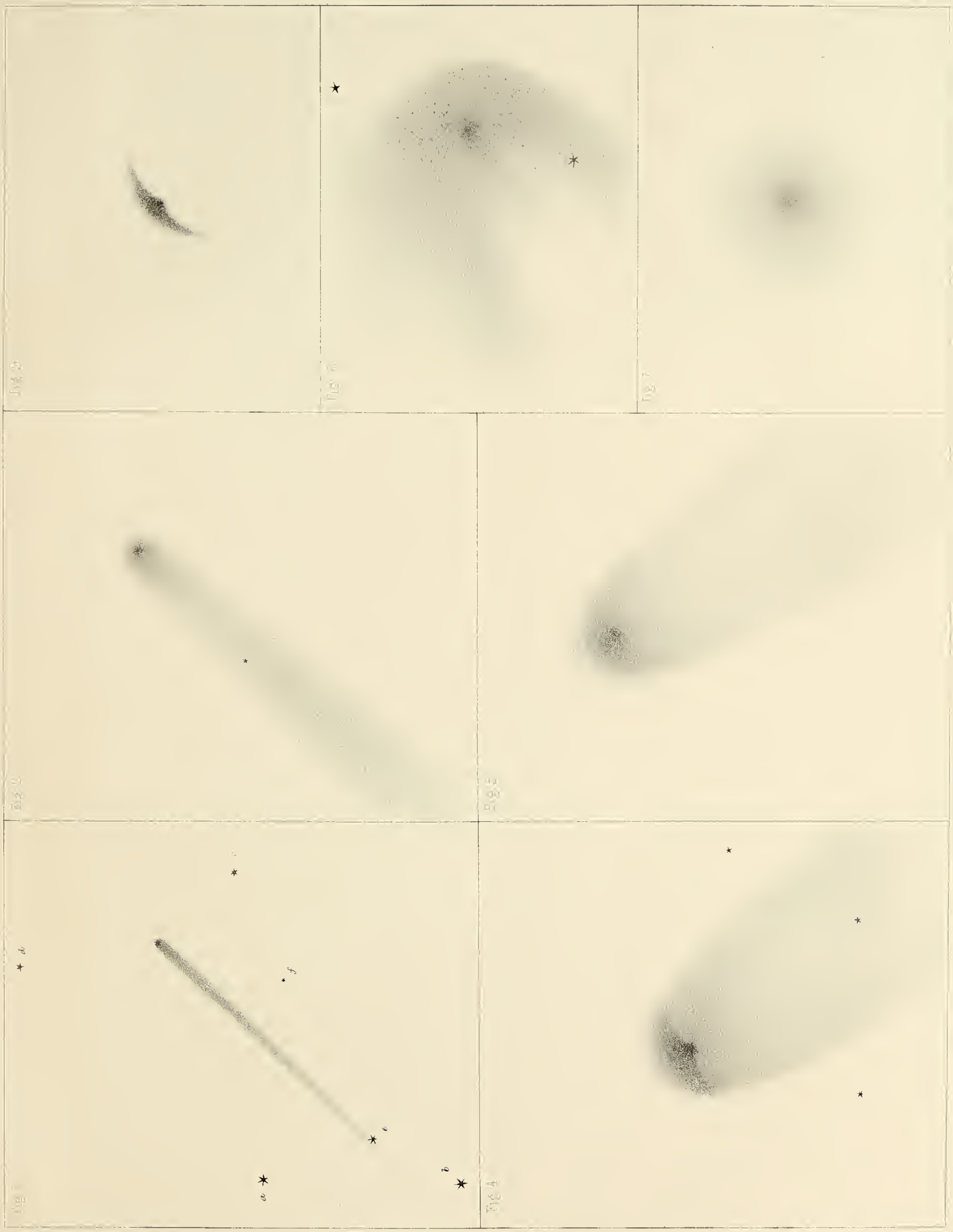
Plate XIII





Course of the Southern Milky Way from Centaurus to Monoceros

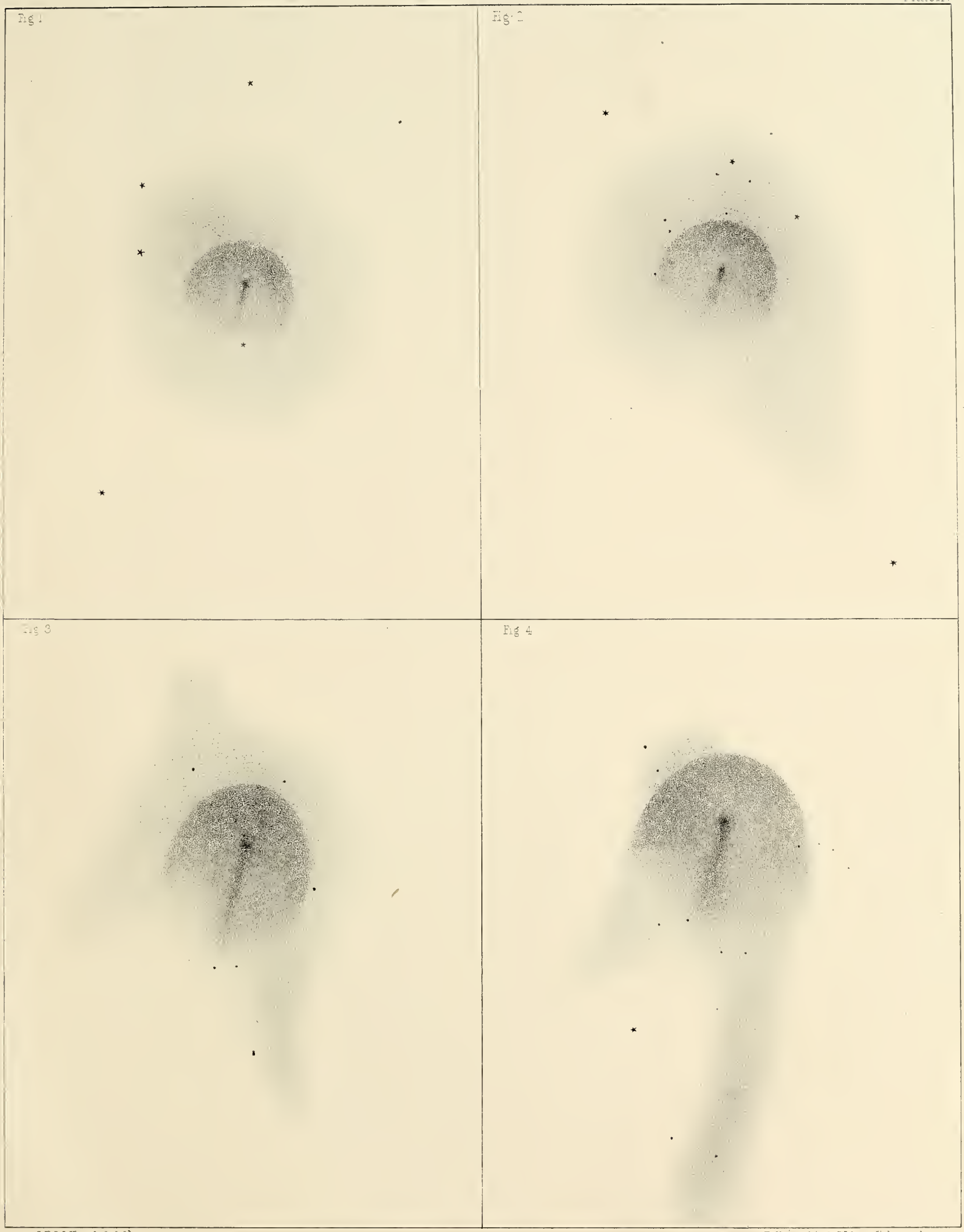
London Smith Elder & Co 65 Cornhill



Hullmandel & Walton lithog.

London, Smith, Elder & C° 65 Cornhill

Plate VII



J. F. W. Herschel delt.   Hullmandel & Walton Lithographers

London: Smith Elder & Co 65 Cornhill.

Plate XVI.

Fig

Fig 2

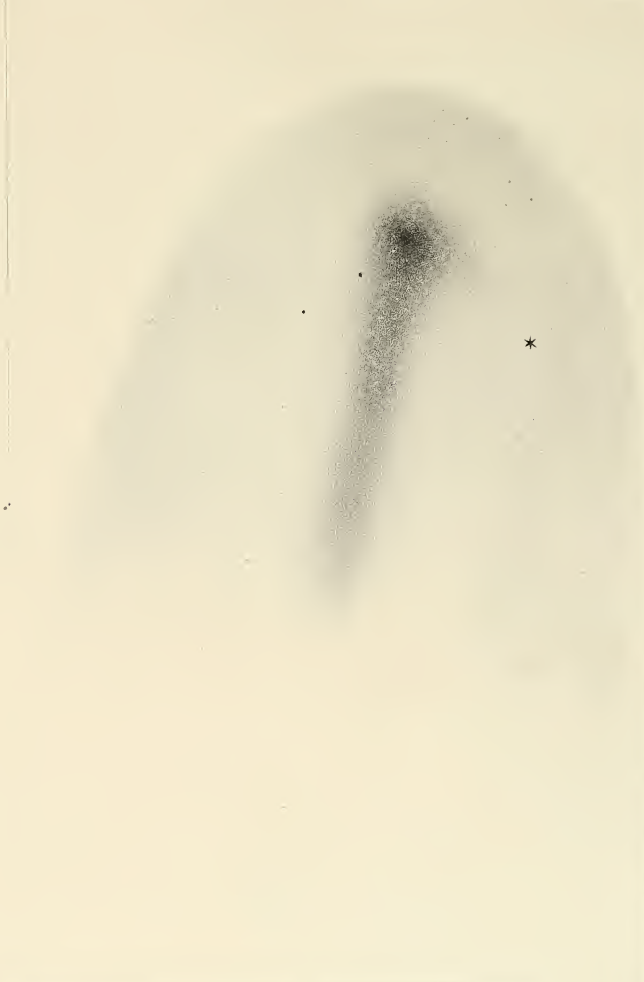


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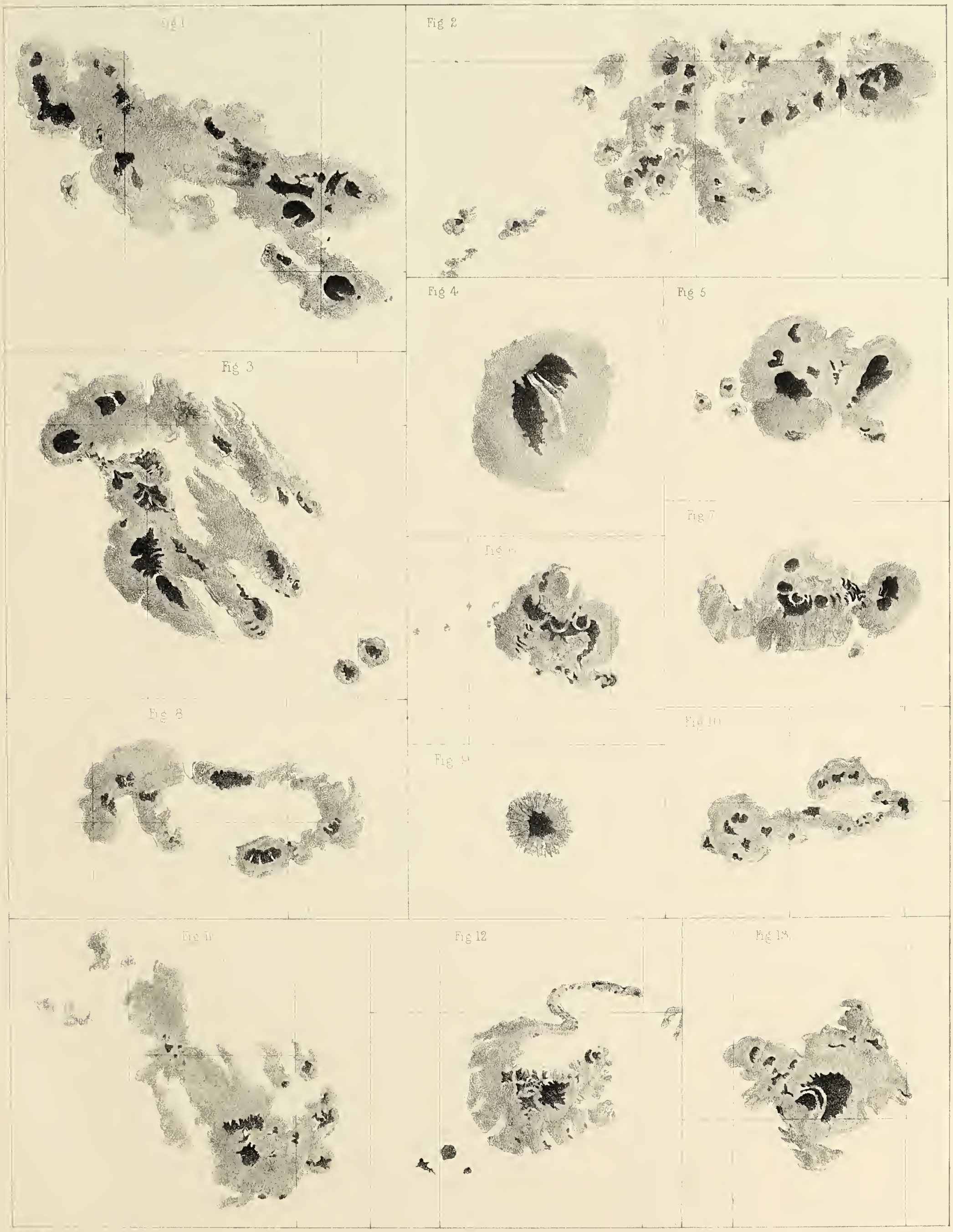
Plate XVII



Hullmandel & Walton Lithographers

London Smith, Elder & C° 65 Cornhill

ERRATA, ADDITIONS, CORRECTIONS, &c.

Page.	Line.	Error.	Correction.
xi	15	however, this	however this
xii	7	as on one	as on an
xiii	26	mirror; in the	mirror in the
4	7	search, thereby caused it to become	search thereby caused, became
7	24	argument	arguments
18	8	Π	π
27	19	respecting	respectively
30	13	215.5	215.1
	19	corraente	corrente
32	14	of chart	of a chart
34	20	7th, 13th	7th and 13th
	25	Spira	Spica
35	7	Rigel, were	Rigel were
	19	April, twelvemonths	April twelvemonths
135	4	Canis Bootis	Canes Bootes
141	1	in thus	and in thus
145	22	the *the whole*	*the whole*
147	33	distinct	distant
148	29	medium	meridian
149	13	nubecula	nubeculæ
166	8	wire secured	wire would allow, secured
247	6 note	valves	values

Page.	Line.	Error.	Correction.
299	1 text	radius vestor	radius vector
299	12 text	9″.69	3″.58
300	18	has	have
304	15	Lyra	Lyræ
340	24	Sequel	Sequence
368	10	2.98 + Log M	2.98 × Log M
	14	3.1514	2744.7
392	13 text	cause	course
394	25	vened sine	versed sine
395	17	nuclus	nucleus
	21	σ =	comet
	22	perihelian	perihelion
397	3	as give	as to give
406	26	time	term
417	3 text	(see Art. 168)	(on further and better consideration of what is said on this head in Art. 170)
418	4	mean, of which	mean of which
427	24	Jupiter	Iapetus
448	$10^h 52^m$	α Hydræ	α Hyd. Crat.
451	25	170 59 7	179 59 7
452	4	west	west,

In the table, p. 391, omitted in their proper places between Nos. 28, 29 and 34, 35—$21^h\ 0^m$, 126°....129°, ∫ 486; $21^h\ 40^m$, 126°....129°; ∫ 486. Also at end of Art. 338, add

In sweep 486 (N P D 126°....129°) at $21^h\ 0^m$ the commencement of the sweep, "the ground of the heavens was most delicately and closely stippled"—at $21^h\ 21^m$ "the stippling has ceased throughout the whole breadth of the sweep though the sky continues perfectly bright"—at $21^h\ 40^m$ "the stippling of the sky resumed of exquisite closeness and delicacy. The left eye shows it perfectly, the right only suggests it. It is like the first aggregation of a precipitate in a liquid. The stippling ceased at 42^m and *that* very abruptly."

CORRECTIONS TO BE MADE IN THE CATALOGUE OF NEBULÆ.

No.	Obs.	Col.	In the	For	Read	No.	Obs.	Col.	In the	For	Read
2309	1	∫	..	735	504	3079		R A	min.	16	17
	2	∫	..	504	735	3111	4	R A	sec.	34.6	32.6
2342		P D	min.	31	21	3126		R A	sec.	18.6	14.6
2349	3	P D	sec.	37	57	3152	4	R A	sec.	42.4	32.6
2350		∫	..	448	484	3162		∫	..	556	566
2359	3	R A	sec.	12.1	72.1	3184		P D	m, s	58 11	25 31
2392	2	R A	sec.	30.1	24.3	3186		R A	sec.	37.2	27.2
2396		R A	min.	6	5	3197		P D	min.	33	53
2423		∫	..	822	802	3205		P D	min.	9	7
2445		Desc.	..	2441	2440	3224	2	R A	sec.	74.6	72.9
				2442	2441	3229		P D	deg.	158	156
2462		P D	deg.	126	127	3259		R A	min.	21	22
2501		∫	..	651	652	3274		P D	min.	57	27
2529		P D	deg.	107	127	3292	1	R A	sec.	17.3	16.7
2686	3	∫	..	657	658	3346	3	P D	sec.	9	29
2715		R A	sec.	14.1	41.1	3509		∫	..	449	451
2761	1	P D	sec.	4	54	3533	2	P D	m, s	....	3° 59
2799	1	P D	min.	16	18	3611	2	P D	sec.	17	57
2864		∫	..	573	523	3614		R A	sec.	10.8	20.8
2896		R A	sec.	38.4	48.4	3679		P D	deg.	123	119
2905	2	P D	sec.	3	23	3711		P D	min.	16	17
2912		R A	sec.	38.8	28.8	3939		∫	..	494	495
2441		∫	..	513	759	3956		P D	sec.	45	25
2959		R A	sec.	32.4	54.8	3966		P D	min.	58	28
2961	3	P D	deg.	....	158	3988		R A	sec.	31.0	41.0
2972	3	P D	sec.	39	59	4007		R A	hour	23	0
3009	2	P D	min.	7	9	4008		R A	hour	23	0
3046		P D	deg.	113	111	4012		R A	hour	23	0

NOTANDA.—2961, obs. 3, belongs to 2959; 3229 is a third obs. of 3231, the degree being wrong; 3259, the minute ought to be 22 in both the observations.

No.	Syn.	R A. 1830.0.	N P D. 1830.0.	Descriptive Remarks, &c.	Sweep.
		h. m. s.d.	° ′ ″		
2359	....	......	......	v L ; p B ; between 3 st 8 m ; seen in twilight................	802
4016	....	5 18 38.9	157 27 13	F ; S ; R ; r	760
4017	Δ.609	8 36 32.9	122 2 41	Cl class 8 ; not m comp ; not v rich ; v irreg fig. ; 5′ diam ; st 12.13 m.	678
3170	....	9 23 59.1	142 9 19	Cl class 7 ; of irreg sc st ; irreg fig. ; fills field. The ✱ taken is one of 2 chief st, the 1st of a small equilateral triangle.	440
4018	....	9 34 4.1	119 16 35	e F ; 40″ ; a B ✱ 8 m follows........................	771
4019	....	10 18 2.5	128 57 18	v F ; above a ✱ 11 m, dist 1½′	574
3358	....	11 37 49.8	145 26 54	e F ; oval or v l E ; v g v l b M ; 2′ l ; 1½′ br ; has milky way stars in it.	436
3369	....	....	....	Seen beyond meridian in sweeps 436, 437.	
3660	Δ.456	16 48 32.1	134 25 13	A v L, rich, but not brilliant cluster, full 20′ diam ; not m comp M ; stars 12.13 m.	455
3689	....	17 23 37.1	122 27 15	A B ✱, chief of a cl 3′ or 4′ in extent	794
4020	....	17 28 28.1	123 8 3	A p rich, L, F, cluster ; class VII. ; nearly fills field ; composed of concave flakes ; not m comp ; st 13 or 15 m.	794
3726	Δ.473	......	......	See a remarkable observation of this nebula by Cacciatore, in the Astr. Nachrichten, No. 113.	
4021	....	18 41 49.7	143 55 31	F ; S ; R ; 15″ ; the following of a group	710
		54.5	55 7	p B ; R ; 90″ ; g p m b M	789

CORRECTIONS TO BE MADE IN THE CATALOGUE OF DOUBLE STARS.

No.	Obs.	Col.	In the	For	Read	No.	Obs.	Col.	In the	For	Read
2306		P D	deg.	105	106	4196		ʃ	..	762	763
3248		R A	min.	21	41	4197		P D	sec.	9	49
3391	2	ʃ	..	....	735	4207		ʃ	..	762	763
	3	ʃ	..	....	502	4256		ʃ	..	647	697
3429		R A	hour	1	0	4278		R A	sec.	19.7	14.9
3431		R A	hour	1	0	4291		R A	sec.	39.0	40.0
3440		R A	hour	1	0	4317		ʃ	..	694	695
3442		R A	hour	1	0	4396		R A	sec.	31.4	34.0
3463	2	ʃ	..	....	489	4411		R A	sec.	58	5.8
3465	1	P D	sec.	41	21	4420	1	ʃ	..	476	436
3474		ʃ	..	624	628	4436		ʃ	..	483	438
3511	2	ʃ	..	....	642	4439		ʃ	..	404	444
3607		R A	sec.	43.6	42.6	4510		R A	min.	7	17
3612	1	ʃ	..	774	747	4535		ʃ	..	580	581
3614		P D	sec.	31	1	4604	3	ʃ	..	456	450
3618	1	ʃ	..	626	526	4683		P D	deg.	151	152
3643	2	ʃ	..	....	804	4738		No.	..	4638	4738
3681		P D	min.	30	36	4801		R A	min.	32	34
3701		R A	hour	4	5	4812	2	ʃ	..	412	462
		P D	deg.	147	157	4813		ʃ	..	718	717
3706		R A	sec.	58.4	50.2	4829 }					
3716	2	ʃ	..	657	658	—— }		R A	min.	35	55
3718		P D	deg.	126	123	4848	1	ʃ	..	702	792
3723		P D	sec.	12	52	4860	2	ʃ	..	573	593
3728	1	ʃ	..	628	638	4867	2	ʃ	..	....	454
3763	1	P D	sec.	25	1 :	4875 }					
3768	1	ʃ	..	654	658	—— }		R A	sec.	3.3	2.3
3829 }						4916		ʃ	..	466	467
—— }		P D	sec.	25	55	4923		ʃ	..	698	699
3847 }						4927		ʃ	..	598	599
—— }	2	ʃ	..	639	539	4966		R A	sec.	55.1	51.1
3884		ʃ	..	766	767	4973		R A	sec.	29.7	25.7
3903		ʃ	..	666	667	4981		ʃ	..	466	467
3913		P D	min.	47	48	5093		P D	min.	20	30
3948		P D	min.	33	38	5105	1	P D	sec.	4	44
3954		ʃ	..	534	535	5130		ʃ	..	465	466
3961		ʃ	..	697	679	5294		R A	min.	35	31
4048	1	ʃ	..	712	772	5296	1	R A	sec.	44.6	46.4
4120	2	P D	min.		58	5326 }					
4132 }						—— }		P D	deg.	160	165
—— }		P D	sec.	21	41	5333		P D	m, s	25 54	55 24
4143		ʃ	..	555	558	5368	2	ʃ	..	796	797
4155		R A	min.	50	49	5409	2	ʃ	..	513	510

NOTES.—Nos. 2306, 3248, belong to my former Catalogues.—In No. 3941, Remarks, *for* exclusively *read* excessively.

No.	R A. 1830.0.	N P D. 1830.0.	Position.	Dist.	Magnitude.	Remarks.	Sweep.
	h. m. s. d.	° ′ ″	°	″			
3350	0 2 —	148 26 ±	173.3	2½	9 10	....	504
5450	5 10 53.3	146 59 39	90.0	3	10=10	Exactly in parallel by the horizontal wire	520
3852	6 15 ..	134 43 ..	6.3	4	9 12	Viewed and measured past meridian............	804
5451	7 15 4.1	113 53 30	12.6	3	10=10	....	532
5452	9 15 12.4	134 45 22	107.6	12	9′ 13	....	685
4835	15 59 59.5	143 47 2	81.8	15	8 8′	....	696
4840	16 6 23.3	124 24 29	296.6	3½	8 9	Neat star................................	791
4948	17 14 8.8	112 37 33	96.9	15	8 11	....	588
5453	18 2 11.4	143 34 59	268.3	12	9 12	....	599

[illegible]